PROGRAM REVIEW
Fairmont State Board of Governors

☐ **Program with Special Accreditation** ☐ **Program without Special Accreditation**

Date Submitted__________________________

Program: BS in Chemistry____
Degree and Title

INSTITUTIONAL RECOMMENDATION

The institution is obligated to recommend continuance or discontinuance of a program and to provide a brief rationale for its recommendation:

_____1. Continuation of the program at the current level of activity;

_____2. Continuation of program with corrective action (for example, reducing the range of optional tracks or merging programs);

_____3. Identification of the program for further development (for example, providing additional institutional commitment);

_____4. Development of a cooperative program with another institution, or sharing courses, facilities, faculty, and the like;

_____5. Discontinuation of the Program

Rationale for Recommendation:

____ _____________________________
Signature of person preparing report: **Date**

____ _____________________________
Signature of Dean **Date**

____ _____________________________
Signature of Provost and Vice President for Academic Affairs: **Date**

____ _____________________________
Signature of President: **Date**

____ _____________________________
Signature of Chair, Board of Governors: **Date**

Executive Summary for Program Review

(not to be more than 2-3 pages)

Name and degree level of program

B.S. Degree in Chemistry, College of Science and Technology

External reviewer(s) (See Appendix III)

Dr. Garry Glaspell
US Army Corps of Engineers ERDC; Chemist
Fellow, Center for the Study of Biological Complexity (VCU)
Collateral Professor, Department of Chemistry (VCU)

Synopses of significant findings, including findings of external reviewer(s)

The American Chemical Society (ACS) "promotes excellence in chemistry education for undergraduate students through approval of baccalaureate chemistry programs." (ACS Guidelines, Spring 2015) Formal national approval of the FSU chemistry program by the American Chemical Society in 2009 was followed by significant curriculum revisions to meet new guidelines of the ACS and to attract additional strong students to the program. As noted by our external reviewer, a major strength of our program lies in the strength of our graduates, who exhibit an impressive level of confidence, competence, independence and achievement, as well as an 88% placement rate in employment or graduate education, including top graduate programs. The chemistry faculty are committed to the open communication and information sharing necessary for effective teamwork, and to fostering strong faculty-student relationships at all levels of the curriculum. Additional strengths include our large and successful service role within the College of Science and Technology.

Plans for program improvement, including timeline

The guidelines from the ACS (Spring 2015) specify: "The American Chemical Society (ACS) promotes excellence in chemistry education for undergraduate students through approval of baccalaureate chemistry programs. […] Approved programs offer their students a broad-based and rigorous chemistry education that provides them with the intellectual, experimental, and communication skills to participate effectively as scientific professionals. Offering such a rigorous program requires an energetic and accomplished faculty, a modern and well-maintained infrastructure, and a coherent chemistry curriculum that incorporates modern pedagogical approaches."

To continue to meet these guidelines, we need to work in the coming five years to strengthen our infrastructure by improving fume hood adequacy and basic physical maintenance in the laboratories, continue to replace and update instrumentation, and ensure continued access to ACS-specified journals. We also plan to continue work on recruitment and retention of qualified students as chemistry majors. One goal, supported by our external reviewer, is to work towards having students choose an actual major when they enter the institution (as opposed to being listed as pre-medical, for example, for most of the time they spend at the institution.) Recruitment and retention are also top priorities, and we will continue working closely with the STEM coordinator, our peer mentors, and first generation student success programs.

Identification of weaknesses or deficiencies from the previous review and the status of improvements implemented or accomplished

The last program review was submitted during the spring of 2013 and the program was recommended for continuation at the current level of activity. Our improvement in attracting and retaining students was noted, as was our assessment work and our adjustment of curriculum and student outcomes to address programmatic needs. The success of our graduates in obtaining employment in WV or seeking additional education via graduate school was cited positively, and our continuation was highly recommended by our Dean.

To continue supporting recruitment and retention, we maintained approval by the American Chemical Society, which provides a mark of national excellence and a recruiting tool for well-prepared students. We also continued working to tailor our curriculum for our student population, by providing flexibility in the sequencing of courses. We retained content and design of the first year course sequence to appeal to the large number of pre-professional students who take those courses and who often also have the interest, academic preparation and work ethic needed to succeed as chemistry majors. We also added video lectures and peer mentors to increase student success in the first year courses. We involved our American Chemical Society Student Affiliates club and Solar Army Student club in visiting high schools and performing chemical demonstrations and hands-on workshops, as well as helping with on-campus recruiting events.

Five-year trend data on graduates and majors enrolled

The number of chemistry and chemical education graduates and majors has remained fairly steady over the past five years. The number of majors (see Table 1 on page 21) averaged 36 ± 4 students for 2012-17, about the same as 2007-12, when the average was 37 ± 7. The number of graduates from the chemistry program also remained stable from 2013-17 (mean 7.8 ± 1.9). Hearteningly, the number of graduates **increased** from our previous 5-year review, when the average was only 5.8 ± 3.1. See Table 2 on page 21.

Summary of assessment model and how results are used for program improvement

Assessments, improvements and modifications that we conduct in our courses and program are designed to improved student learning success and to maintain our program within the guidelines for continued approval by the American Chemical Society. Course and program-level assessment is undertaken by the program faculty in consultation with our chemistry advisory board, and assessment plans and data are stored in TaskStream. We engage students in a coherent curriculum, designed around concrete learning outcomes that build from course to course. Program threads are embedded in our courses and feed into our program outcomes. We are committed to building skills in our lower-level courses to provide the means of success in higher-level courses and after graduation, and we track the success of this process with specific assessments defined for each course and program outcome. Findings are discussed in program meetings and changes are made as necessary to improve student learning and success.

Data on student placement (for example, number of students employed in positions related to the field of study or pursuing advanced degrees)

Chemistry program graduates from 2013-17 are 88% employed or pursuing graduate study, largely in chemistry-related fields. We maintain close contact with our graduates, of whom 42% are employed in field, 11% employed out of field, 24% enrolled in graduate school in field, and 11% enrolled in professional school (e.g., medical, dental, pharmacy). For the past five years, a greater proportion of our graduates have enrolled in graduate and professional schools than in the 2007-12 period.

Final recommendations approved by governing board

PROGRAM REVIEW

FAIRMONT STATE UNIVERSITY OR PIERPONT COMMUNITY AND TECHNICAL COLLEGE	
Program:	Chemistry
School:	College of Science and Technology
Date:	

Program Catalog Description:

The mission of the Chemistry Program at Fairmont State is to help students learn chemistry, and how it connects to computers, mathematics, biology and physics. The program strives to foster excellent oral and written communication skills, and is approved by the American Chemical Society. With small class sizes, innovative teaching approaches, and hands on access to modern, research-quality instrumentation, students can develop the analytical, problem-solving and teamwork skills necessary to successfully pursue science-based careers. A student completing the B.S. degree with a major in chemistry will be competitive for graduate study in chemistry or chemical engineering, laboratory positions in the chemical industry, pharmaceutical industry or government agencies, or application to law school. By electing a few additional biology classes, students completing a B.S. degree in chemistry will be prepared for application to a variety of professional and graduate schools, including medical school, dental school, veterinary school, pharmacy school, physical therapy programs, toxicology, pharmaceutical science and forensic science graduate programs.

Programs available for students who wish to specialize in chemistry include:

1) The B.S. in Chemistry is approved by the American Chemical Society and provides a well-balanced program of courses in the major fields of chemistry, as well as mathematics and physics. A student completing this program will be a competitive candidate for graduate study or positions in industry or government agencies.

2) The B.S. in Chemistry with an emphasis in biotechnology provides chemistry majors with an additional grounding in biology and prepares students for professional schools and graduate study in forensic science and pharmaceutical sciences.

3) The B.A. in Education with a specialization in chemistry equips the graduate to teach chemistry in any secondary school or to pursue graduate studies in science education.

VIABILITY (§ 4.1.3.1)

Enrollments

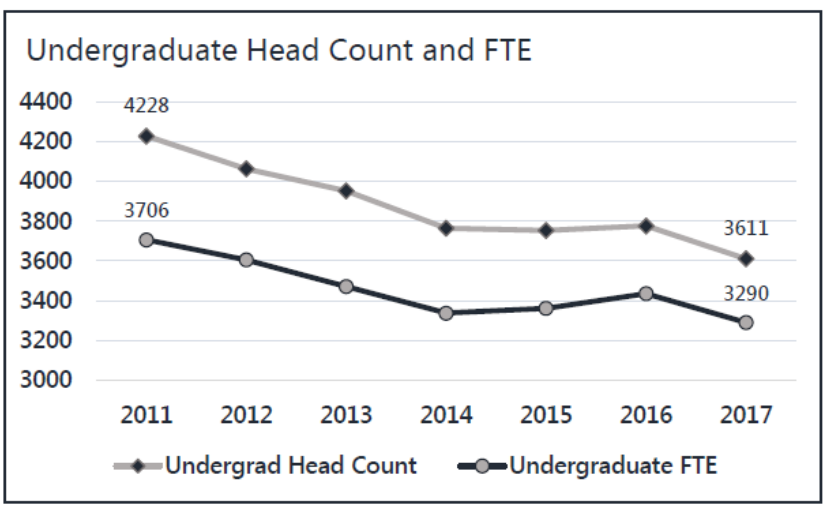
Applicants, graduates

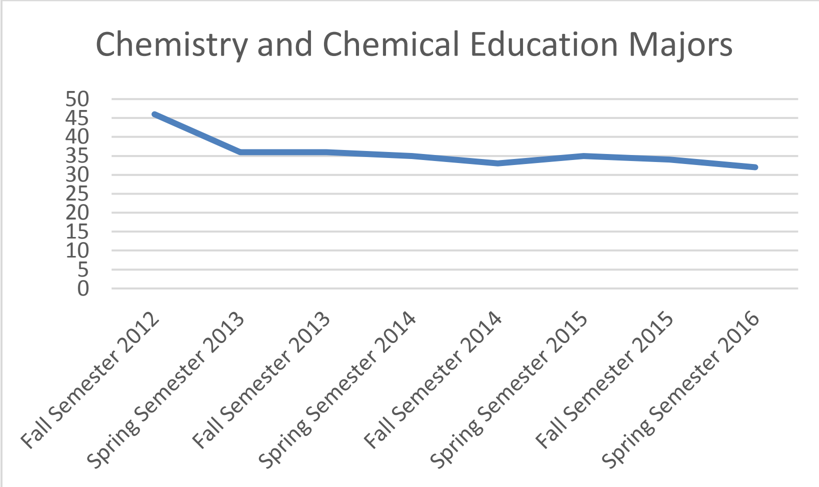
While our majors tend to be well-prepared academically, any student admitted to the university can declare a major in chemistry. Enrollment in the first year chemistry majors course requires an ACT math score of 20; SAT math 480 or better (or equivalent). Students who do not meet this requirement can still declare their major as chemistry but need to complete remedial courses before beginning the curriculum.

Chemistry and chemical education majors during the fall and spring semesters of the academic years of 2012 – 2016 averaged 36 students, with a standard deviation of 4 students. Data were not available for academic year 2016-7. (Refer to Table 1). Numbers of majors followed a similar pattern as overall enrollment at FSU during the same time period (2012-2016 data; see below.)

Table 1. 2017 Fall Census Data Reported to HEPC

	Head Count	Full-Time Equivalent (FTE)
Undergraduate	**3,661**	**3,325**
First-time	764	767
Returning	2,290	2,131
Readmitted	133	99
Transfer	301	266
High school	38	11
Other	135	51





Graduation rates for chemistry and chemical education majors during this same time period have ranged from 5 to 10 (mean 7.8 ± 1.9) (Refer to Table 2). Graduates are reported by academic year (e.g., Fall 2012 graduates are reported in the 2013 year). Table 2 shows the number of graduates has remained solid despite our offering of some required courses every other year and despite a small decline in overall declared chemistry and chemical education majors. Also, the new curriculum appears to be bearing fruit since the number of graduates is up relative to the previous 5-year review (for 2007-12, mean 5.8 ± 3.1).

We have compiled a list of all recent graduates and to the best of our knowledge, their current employment or continuing education status (Refer to Table 6). The chemistry program tracks graduates as part of our American Chemical Society Annual Report, and we also sent out a survey to alumni for this program review. The survey was sent to 29 students and we got 22 responses. A summary of what graduates are doing is given below. Chemistry program graduates are 88% employed or pursuing graduate study, largely in chemistry-related fields. For the past five years, a greater proportion of our graduates have enrolled in graduate and professional schools than was true in the previous five year period.

Education and/or Employment Status of Recent Graduates of the Chemistry Program (2012-2017)

	Graduates	
Category	Number	Percent
Employed in Field	16	42
Employed out of field	4	11
Graduate school	9	24
Professional school	4	11
Not seeking employment	2	5
Seeking employment	0	0
Unknown	3	8
Total	38	100

Positive aspects of the Chemistry Program:

- Impressive level of confidence, competence, independence and achievement exhibited by graduates
- Graduates finding good jobs and being accepted into academically excellent graduate and professional programs around the country
- Strong faculty-student relationships, student-centered program decisions
- Faculty committed to the open communication and information sharing necessary for effective teamwork
- A coherent curriculum, designed around concrete student learning outcomes that build from course to course
- Small class size and active learning strategies, including strong peer mentoring
- Hands-on experience with instrumentation throughout the curriculum

Areas that will strengthen our Chemistry Program:

- **Tailor curriculum for the student population and clarify the status of pre-professional programs**
  We have a large service population in our first-year chemistry courses since all pre-professional students take those courses. Thus, our goal has been to design the first year course sequence to appeal to students who have the interest, academic preparation and work ethic needed to succeed in chemistry (see Assessment section). A chemistry major provides an excellent preparation for graduate and professional schools of all sorts, and we are continuing to see success with encouraging students who come in as "pre-medical, pre-pharmacy, pre-dental" students, especially, to declare a major in chemistry. Our numbers of chemistry majors would increase significantly if students had to choose an actual major when they enter the institution (as opposed to being listed as pre-medical, for example, for most of the time they spend at the institution.) While it is not possible to graduate with a major in pre-medical studies, incoming students don't realize that, and have no particular incentive to declare a true major. Some incentives have been applied, such as allowing students to apply for NASA WV Space Grant Consortium research fellowships only if they have a declared major in our college and not as a "pre" major.
- **Increase student population**
  We are working towards increasing our recruitment efforts, with our American Chemical Society Student Affiliates club and Solar Army Student Club visiting high schools and performing chemical demonstrations, holding hands-on workshops and helping with on-campus recruiting events. Recruitment and retention are high priorities for our College of Science and Technology and the presence of a Title III Strengthening Institutions grant from 2012-7 was helpful in encouraging student retention and success in introductory science and math courses. Chemistry faculty redesigned courses, modernized lab equipment and implemented a strong system of peer mentoring in the courses during the first two years under the auspices of this grant. Evidence of increased retention in CHEM 1105 due to peer mentoring was a major finding of the grant.

- **Increase success rate in first-year course**
  Increasingly, students enter college without the needed study skills and work ethic to succeed. The first course in chemistry provides a serious wake-up experience for many such students. We are working closely with our STEM coordinator, who was originally hired under a Title III Strengthening Institutions grant, to promote student success in this course. Peer mentors, video lectures and a flipped classroom, and mastery grading have all helped. We are still

actively exploring ways to increase success in this course while giving students the substantial content and skill background they need to get from it.

- **Maintain and update facilities and equipment**
  Basic facilities maintenance is needed. While some work orders are addressed immediately, there are others that have not been addressed for years. We have sinks leaking large amounts of water, pipes that freeze and burst when it is cold, ceiling leaks into that are addressed by an open bucket for 2 years or more, and offices and classrooms that experience extremes of temperature (from 58 degrees to 90 degrees). Such temperature (and humidity) fluctuations are hard on scientific equipment and people. On a more positive note, we have been active during the past 5 years in surplusing outdated and unfunctional equipment and purchasing replacement equipment with the help of external grants. This process needs to continue.

Program courses

Students majoring in Chemistry complete eleven core chemistry courses (Refer to Appendix III – B.S. Degree in Chemistry – Compliance with the Degree Definition Policy). In addition students are required to complete two semesters of Calculus and Physics as well as the FSU general studies requirements. Students pursuing a chemistry certification for their education degree complete six core courses.

Enrollments in courses for the chemistry major are provided in Table 3. Table 3 shows a significant difference in the number of students enrolled in CHEM 1105 and CHEM 2200 as compared to the upper-level courses. At first glance this might be considered a retention issue (retention is discussed in the Graduation/Retention section). However, CHEM 1105 and 2200 are also service courses because other programs require these courses, but not necessarily the upper-level courses; for example: Biology, Exercise Physiology, Forensic Science, Biotechnology Area of Emphasis, and many pre-professional areas of study.

BACHELOR OF SCIENCE IN CHEMISTRY .... 120 SEM. HRS.

Chemistry Curriculum (see below)* ...... 57-59 SEM. HRS.
General Studies Requirements.............. 42-45 SEM. HRS.
Free Electives*...................................... 16-21 SEM. HRS.
No Minor Required

*Choosing higher-credit hour alternatives in the major curriculum reduces the minimum number of free elective credit hours required to reach 120 semester hours.

- Chemistry Curriculum .... 57-59 SEM. HRS.

Required courses (57-59 hrs.)

BIOL	3360	BIOCHEMISTRY	4
CHEM	1105	CHEMICAL PRINCIPLES	5
CHEM	2200	FOUNDATIONAL BIOCHEMISTRY	4
CHEM	2201	ORGANIC CHEMISTRY I	4
CHEM	2202	ORGANIC CHEMISTRY II	4
CHEM	2205	ANALYTICAL CHEMISTRY	4
CHEM	3315	INSTRUMENTAL ANALYSIS	4
CHEM	3301	PHYSICAL CHEMISTRY I	4
CHEM	3304	INORGANIC CHEMISTRY	4
CHEM	4404	SYNTHETIC METHODS AND MATERIALS	4
CHEM	4412	PHYSICAL CHEMISTRY II	4
MATH**	1585	APPLIED CALCULUS I	**4
-OR-			
MATH**	2501	CALCULUS I	**4
MATH	1586	APPLIED CALCULUS II	*4
-OR-			
MATH	2502	CALCULUS II	4
PHYS	1101	INTRODUCTION TO PHYSICS I	*4
-OR-			
PHYS	1105	PRINCIPLES OF PHYSICS I	*5
PHYS	1102	INTRODUCTION TO PHYSICS II	4
-OR-			
PHYS	1106	PRINCIPLES OF PHYSICS II	*5

* Note: MATH 1585 (or MATH 2501) is required for the chemistry major; the hours for this course are counted under General Studies requirements, Outcome 2.

** Students who do not meet the prerequisites for MATH 1585 or 2501 will be required to take MATH 1430 or MATH 1530 and/or MATH 1540.

- General Studies Requirements..............42-45 SEM. HRS.

Outcome 1 – Critical Analysis
ENGL 2220* or any other in Outcome 1 3
Outcome 2 – Quantitative Literacy
MATH 1585/2501 (Satisfied in Major) 4
Outcome 3 – Written Communication
ENGL 1101 (Institutional Requirement) 3
Outcome 4 - Teamwork
CHEM 4412 (Satisfied in Major) X
Outcome 5 – Information Literacy
ENGL 1102 (Institutional Requirement) 3
Outcome 6 – Technology Literacy
BISM 1200* or any other in Outcome 6 3
Outcome 7 – Oral Communication
COMM 2200 or 2201 or 2202* 3
Outcome 8 - Citizenship
Any course in Outcome 8..3
Outcome 9 - Ethics
ENGL 2220* or any course in Outcome 9..3
Outcome 10- Health
PHED 1100* or any other course in Outcome 10..........................2-5
Outcome 11- Interdisciplinary
Any course in Outcome 11..3
Outcome 12 - Arts
Any course or combination of courses in Outcome 12......................3
Outcome 13 - Humanities
HIST 1107/08* or any other course in Outcome 13 3
Outcome 14 – Social Sciences
GEOG 2210* or any other course in Outcome 14............................3
Outcome 15 - Natural Science
CHEM 1105 (Satisfied in Major) X
Outcome 16 – Cultural Awareness
GEOG 2210* or any course in Outcome 16 3
Additional General Studies hours
CHEM 3301 (WIC – Satisfied in Major)..X

* Any course(s) marked with an asterisk (*) above are recommended to complement the program curriculum; however, students may select any other courses from the approved General Studies list.

Service courses

Service courses outside the Chemistry major:

CHEM 1101 – General Chemistry I

CHEM 1102 – General Chemistry II

Demand for service courses remains high, with students in medical laboratory technology, veterinary technology, civil engineering technology, mechanical engineering technology, electronics engineering technology, and occupational safety taking Chem 1101 and students in some of these programs also taking Chem 1102.

There are a few students in programs that enroll in Chem 1101 to satisfy FSU's General Studies requirement. Some students take Chem 1101 and possibly Chem 1102 in order to prepare themselves to take the major's level Chem 1105 course.

Some sections of these courses are taught by adjuncts, but the goal of the program is to have at least one full time faculty member teaching a section of these courses every term. The full time faculty member serves as a point of contact for the adjunct instructors. Chem 1101 is offered every semester and in the first summer term. Chem 1102 is offered in the spring semester and in the second summer term.

Enrollments in service courses for the chemistry program are provided in Table 4.

Success rates Service Courses

Service course success rates are provided in Table 5. In this table "success" is defined as the percentage of students who received a grade of A, B, C or D compared to all students who received a grade (A, B, C, D, F, W, I, NR) for the course. Students who dropped the course prior to the drop deadline (first 5 days of classes) are not included. The success rate for CHEM 1101 is 85.0 %, CHEM 1101 online is 51.9%, and CHEM 1102 is 92.2%. The average success rate is 85.2%.

Extended education / off campus Courses

None of the science courses for chemistry majors are taught off of the main campus.
Table 7 lists all courses taught on and off campus. Of the courses listed, 90.3% of the students are instructed on the main campus and 2.9% are instructed through virtual on-line courses. The chemistry program faculty have worked with local high school teachers to develop several high school dual enrollment courses. In these courses, the students receive both high school credit and college credit. We will continue to have more of these courses in the future. Table 10 lists enrollments in courses taught by full and part time faculty. Some of the part time faculty taught courses through Pierpont. In these situations, we were supposed to approve the instructor and the instructor was supposed to use the same textbook and teach the same material that was taught in our courses. In some cases this was done. However, in many cases this was not done. This was

not done in courses that collectively had 205 students. Part time faculty taught a total of 842 students. This means that 75.7% of the students were taught by faculty that were approved by our program and taught the courses using the same textbook and teaching the same material.

Cost/student credit hour

We don't have access to specific costs for the chemistry program. Alternatively, presented below are the costs for the College of Science and Technology compared to other Schools and Colleges at FSU. We were not able to locate the date for 2015-16; however, considering the trend over the last few years it can be expected that the figures for the missing year are not significantly different when compared to the others. The most recent data (2016-17) for the College of Science and Technology shows that the cost per credit hour ($165) is slightly above the value for the institution ($150) and the costs per Student FTE Major ($4,894) is comparable to the total for the institution ($5,038).

Direct Cost per Instructional Credit Hour					
College or School	**2016-17**	**2015-16**	**2014-15**	**2013-14**	**2012-13**
College of Liberal Arts	$94	na	$79	$81	$94
College of Science & Technology	$165	na	$153	$153	$164
School of Business	$147	na	$107	$123	$156
School of Fine Arts	$189	na	$156	$160	$164
School of Education/Health & Human Performance	$232	na	$155	$156	$205
School of Nursing & Allied Health Administration	$221	na	$181	$182	$196
Total Institution	**$150**				
Direct Cost per Student FTE Major					
College or School	**2016-17**	**2015-16**	**2014-15**	**2013-14**	**2012-13**
College of Liberal Arts	$4,703	na	$4,964	$5,030	$4,795
College of Science & Technology	$4,894	na	$5,026	$4,841	$4,946
School of Business	$3,815	na	$4,364	$4,101	$3,867
School of Fine Arts	$19,563	na	$2,170*	$17,366	$17,025
School of Education/Health & Human Performance	$4,047	na	$3,487	$3,593	$3,121
School of Nursing & Allied Health Administration	$6,257	na	$5,719	$13,015	$5,993
Total Institution	**$5,038**				

Note: The 2012 - 2015 data was obtained from a program review posted on the webpage of the board of governors; the 2016-17 data was obtained from Andy Raisovich; the 2015-16 data could not be located (no program reviews were posted in 2017).
**Presumably a typo in the source of the data.*

Liberal Studies Requirements Met

The chemistry program is in compliance with the Fairmont State Degree Definition Policy. (Refer to Appendix III – Compliance with Degree Definition Policy – B.S. Degree in Chemistry on page 47.)

Chemical Principles (CHEM 1105) has been submitted to satisfy quantitative reasoning and natural science attributes in our new general studies curriculum, and all of our courses promote problem solving. CHEM 4412 Physical Chemistry II satisfies teamwork in our general studies curriculum, and most courses include team assignments. Our majors all take COMM 2200 Intro to Human Communication and give presentations in various courses (poster, oral and online). We are committed to having students practice presenting and have used organic poster sessions, inorganic presentations, synthetic methods poster presentations, demonstrations and derivation presentations in physical chemistry, and protein presentations in CHEM 2200. Ethics is addressed explicitly in the Chemical Principles course with a Calibrated Peer Review (CPR) assignment (Ethics in Pathological Science) followed by a citation activity in Foundational Biochemistry. Plagiarism/teamwork/citation issues are discussed frequently because every course includes a variety of assignment types that require student writing and research. Students also write lab reports in every course, and these are graded using a rubric that increases in sophistication as students' progress. Physical Chemistry I (CHEM 3301) is designated as the program's writing intensive course.

Assessment Requirements

National approval requirements

With the formal, national approval of our chemistry program by the American Chemical Society (ACS) in the fall of 2009, we began providing annual and periodic (5-year) reports to the ACS. Assessments, improvements and modifications that we conduct in our courses and program are designed to maintain our program within the guidelines for approval by the American Chemical Society. New guidelines established by the American Chemical Society resulted in a large curriculum revision that begun in 2009 and was formally approved in the fall of 2011.

Advisory Board and program faculty contributions

We have instituted a formal advisory board consisting of representatives from industry and other educational institutions. They have provided very useful feedback, most recently on a reduced need for high level writing skills for entry-level chemists in industrial settings.

The chemistry program meets weekly, and maintains a strong collegial atmosphere with respect to sharing assessment information from various courses and perspectives. We work regularly on improving our program and courses, using a mixture of anecdotal and quantitative data. We use program meetings to discuss necessary changes on the course and program level, and faculty or teams of faculty responsible for each course implement the changes and report on results.

Institution-wide assessment

Fairmont State University uses TaskStream to store program- and course-level assessment data, with annual assessment plans including student learning outcomes, specific and direct methods of assessment for each outcome, assessment data, and how the data are used to improve student learning. The chemistry program began this process in 2007, and it has enabled us to develop and maintain a coherent curriculum, designed around concrete student learning outcomes that build from course to course. In addition to results of signature assignments as measures of program outcomes, graduating seniors take the ETS test in chemistry and the ACS Diagnostic of Undergraduate Chemistry Knowledge (Form 2008) test. We also use standardized tests from the American Chemical Society to assess the performance of the students in the following classes: CHEM 1105/ 2200, CHEM 2201/2202, CHEM 2205, CHEM 3301/4412), BIOL 3360 and CHEM 3304. In addition, we administer the California Diagnostic Test for our incoming students in CHEM 1105. While we do not always structure our courses or curriculum to match these course-level tests, we use them to provide us with a baseline to assess the effects of changes in these courses.

Chemistry (B. S.) Assessment Plan (from 2016/17 cycle)

Mission Statement

The mission of the Chemistry Program at Fairmont State is to help students learn chemistry, and how it connects to computers, mathematics, biology and physics. We expect and encourage our students to develop the analytical, experimental and problem-solving skills necessary to successfully pursue chemistry and other science-based careers. (program mission webpage: http://www.fairmontstate.edu/collegeofscitech/academics/department-natural-sciences (last access 9/25/17)

B. S. Chemistry Program Goals

The chemistry program aspires to:

B. S. Chemistry Program Goal 1

Maintain approval by the American Chemical Society.

Measure: ACS Reports

Details/Description: CPT accepted our annual report from the previous year. (always due in August)

B. S. Chemistry Program Goal 2

Ensure that graduates find employment or get accepted to graduate or professional schools.

Measure: Graduate Tracking

Details/Description: The program maintains records concerning placement of graduates into graduate or professional schools or finding of jobs for those actively seeking work.

B. S. Chemistry Program Outcomes

Upon successful completion of this program, students will be able to:

B. S. Chemistry Program Outcome 1

Demonstrate competency in the laboratory skills expected of a practicing chemist.

Measure: Faculty Evaluation of Student Laboratory Competencies

Details/Description: Faculty assess student’s laboratory competencies in chemistry courses (Chem 2205, 3301 3304, 3315, 4404, 4412, Biol 3360) using a general programmatic rubric.

B. S. Chemistry Program Outcome 2

Demonstrate foundational knowledge needed by chemical professionals.

Measure: Diagnostic of Undergraduate Chemistry Knowledge (Standardized ACS Exam)

Details/Description: Performance on the standardized exam.

Measure: ETS Major Field Test

Details/Description: Performance on ETS tests

B. S. Chemistry Program Outcome 3

Apply foundational knowledge to analyze complex problems.

Measure: Analytical Non-linear least squares Assignment

Details/Description: Students in Chem 2205 (Analytical Chemistry) are required to obtain a titration curve for a diprotic acid, and model it with excel solver, to perform a non-linear least squares fit. Out of this they obtain the acid dissociation constants.

Measure: Green Chemistry Challenge

Details/Description: Chem 4404 (Synthetic Methods and Materials) Green Chemistry Challenge

B. S. Chemistry Program Outcome 4

Competently access, evaluate and learn new chemical information and skills.

Measure: Green Chemistry Challenge

Details/Description: CHEM 3315 Instrumental Analysis. Take-home exam on determining pH from Beer's Law can demonstrate the learning of new information.

Measure: STN/Plan of Procedure

Details/Description: Chem 4404 - Students will retrieve synthetic procedures from the primary literature and prepare a detailed plan of procedure

Course outcomes build to program outcomes

Course outcomes are revisited periodically and modified for course and program improvement. Program threads are embedded in our courses and feed into our program outcomes. We are committed to building skills in our lower-level courses to provide the means of success in higher-level courses and after graduation. For example, one program outcome is about learning and accessing new information. Students in CHEM 1105 Chemical Principles access an ACS journal article and analyze its structure. Students also research safety and physical properties for chemicals in CHEM 1105 and learn how to use the Merck Index, CRC handbook, MSDS, and chemical company sites to access information. All subsequent laboratory courses require this skill. In CHEM 2200 Foundational Biochemistry students access an ACS journal article and then follow a citation to another article, and analyze the citation process. Upper-level students complete an introductory assignment using SciFinder (a literature searching service specific for chemistry) to find a synthetic procedure for a specified compound. SciFinder is then used at a more detailed level in the Synthetic Methods course. Students in Instrumental Analysis access a variety of books and websites to learn about chemical instrumentation. The skills are assessed by grading of assignments in each course.

Reflection on some of the data from the 2016-17 Assessment Cycle

ACS Approval (Goal 1)

The program is meeting the requirements for approval by the American Chemical Society. Some instrumentation in the laboratories is in the process of being replaced by new equipment (GCMS, AA) while the HPLC was donated to WVU to stream line instrumentation maintenance and to reflect actual usage in the curriculum.

The access to library resources was an issue. We were notified at the beginning of the academic year that the library cannot subscribe to the ACS journals and SciFinder anymore. Although the subscriptions were later renewed, we still met with the interim director of the library and the CEO to explore other possibilities to maintain the minimum access required by the ACS.

Graduate Placement (Goal 2)

For the years 2011 – 2017, we have information for 43 out of 50 students. The vast majority (86 %) found employment or got accepted into a graduate program.

Skills and Knowledge (Outcomes)

In comparison to normed data (Outcome 2 – Knowledge)

ETS Major Field Tests

From 2011 – 2017, 44 students took the test averaging around the 44th to 58th percentile in the different subcategories. Overall the students scored in the 50th percentile.

	Total Score	Pchem	Ochem	InChem	AnalyChem
2011-2017 average	148	48	47	53	48
ETS mean	148	48	48.3	48.3	48
std	11	13	11	10	12
ETS std	14.6	15.1	14.3	14.8	14.5
count	44	44	44	44	44
ETS count	8836				

Table 1: Raw Scores on the ETS Major Field Test in Chemistry from 2011 - 2017

	Total %tile	Pchem %tile	Ochem %tile	InChem %tile	AnalyChem %tile
2011-2017 average	50	47	44	58	47
ETS mean	54	50	55	52	56

Table 2: National Percentiles on the ETS Major Field Test in Chemistry from 2011 - 2017.

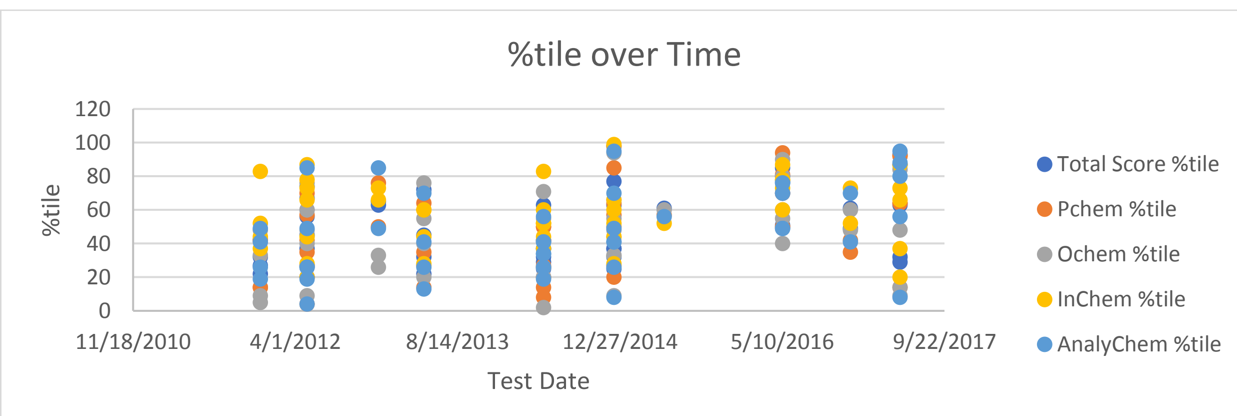


Diagram 1: A graphical representation of the distribution of individual percentile subscores based on the test dates of different student cohorts.

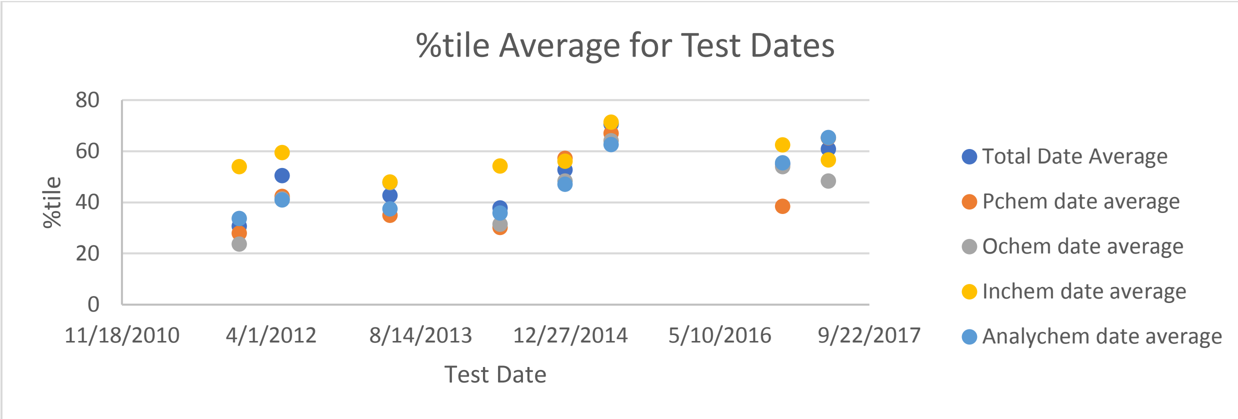


Diagram 2: A graphical representation of the distribution of average percentile subscores based on the test dates of different student cohorts.

Comparing the 2011 – 2017 data with the data starting in 2006 is difficult due to large fluctuations in the number of students. The overall 2006 – 2017 percentile averages (based on 2011 – 2016 ETS statistics) doesn't seem to be significantly different from the 2011 – 2017 data.

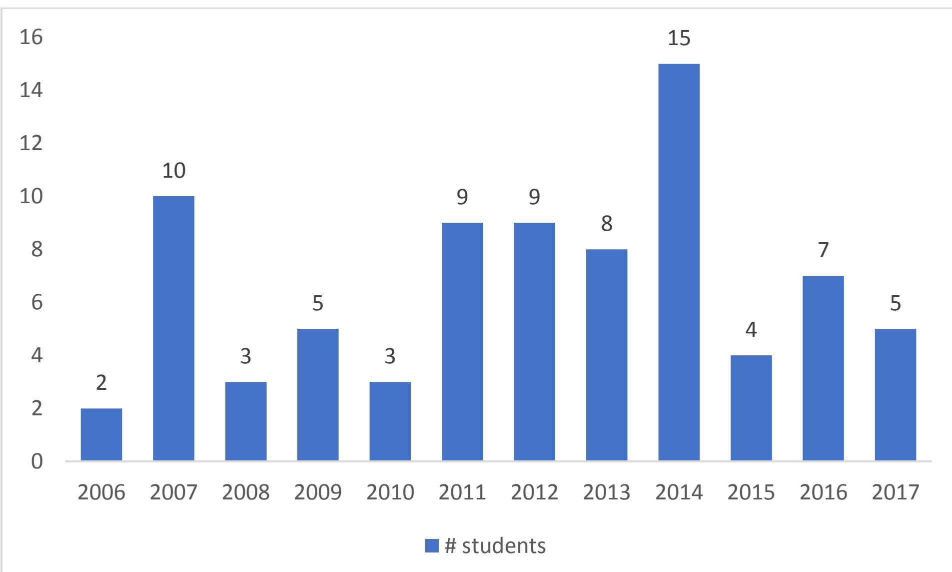


Diagram 3: Number of chemistry graduates by graduation year.

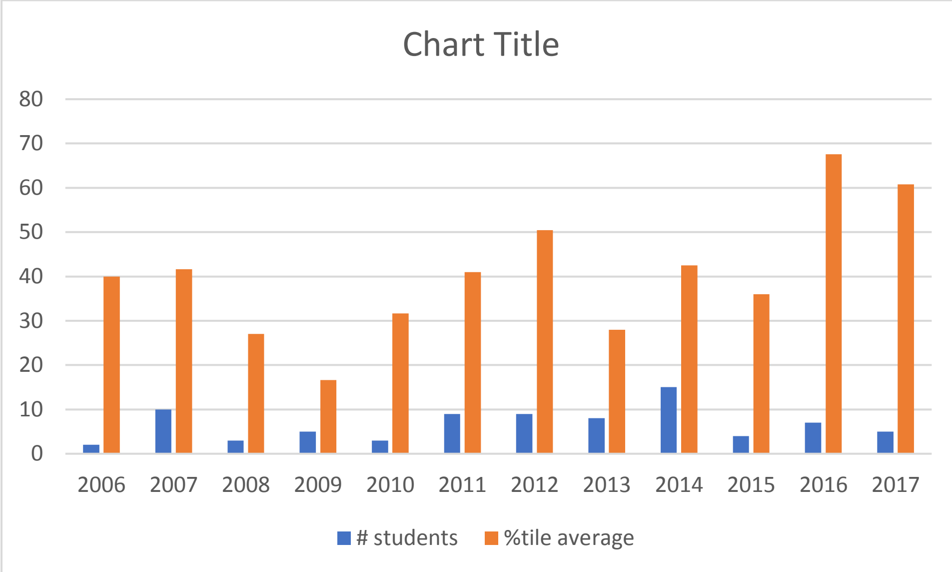


Diagram 4: Number of chemistry graduates and the corresponding average score on the ETS Major Field Test in Chemistry by year.

ACS Diagnostic of Undergraduate Chemistry Knowledge

7 students score on average in the 57^{th} Percentile (range 14^{th} – 89^{th} Percentile).

In-house findings

Our students demonstrated overall laboratory competencies expected from a practicing chemist (Outcome 1, based on observations in Chem 2205, 3315, 4404). Although data from Chem 2205 and 4404 indicate that students could apply foundational knowledge to analyze complex problems (Outcome 3) the transfer of knowledge (GCMS analysis) between classes was lacking during the final project in Chem 4404. Next year, the laboratory curricula of Chem 3315 and Chem 4404 will coordinated to support the application of Chem2205/3315 skills to synthesis. Students were able to access new chemical information (Outcome 4) using SciFinder (Chem 4404) but failed to demonstrate that they learned and applied new information/skills during an exam (Chem 3315). The application of newly acquired information will be supported by a POGIL activity in the future.

Reflection/Recommendation

Overall, the program is doing well based on the consistent performance of our students based on nationally normed tests. The large majority of our students find employment or get accepted to graduate schools shortly after graduation from our program. At least anecdotally they seem to be well prepared for their new endeavors.

Currently, the normalized tests taken during the student’s last semester, do not count towards any of their courses. We just hope that they will take the tests seriously and try to score high. It would be interesting to see how the data change if the last chemistry course uses their scores as part of their final grades.

Larger in-house issues seem to be skill/knowledge transfer between courses. Since the curriculum seems to settle in after the last revision, perhaps it is time to correlate different laboratory activities between different courses.

Adjunct use

Table 10 lists courses taught over the last five years sorted by faculty status (full time vs. part time). Of the total enrollment, 76% of the students are taught by full time faculty. The program is very careful in selecting adjunct faculty, especially for courses in the major. We were fortunate to be able to find highly qualified faculty with a strong chemistry background; several faculty hold M.S. and Ph.D. degrees in chemistry or education.

Graduation/Retention Rates

See Graduation rates in Table 2 on page 21. Retention rates are extremely difficult to determine with the data provided. At this point we can postulate many exit points from the program other than graduation (for example: change of major, transfer to another institution, acceptance into professional school, dropping out). A detailed examination of the retention rate would require an analysis of each individual student's progress through the curriculum. Currently it is very laborious to get this information from the University and in some cases the information is simply not available. (For example, we may not be able to determine if a student transferred or dropped out. All we know is that they did not register for classes in a given semester.)

However, due to the faculty's emphasis of putting our students first by spending a lot of time with advising and fostering individual students, we were able to observe that our students often decide to major in chemistry only after achieving success in several chemistry courses. At the same time, many students who come in thinking they will major in chemistry realize after seeing the rigor of the subject that they would prefer a different path. Thus the students who graduate are not the students who enter as chemistry majors. Once students declare a major and start 2nd year majors-level courses, they typically are retained and graduate.

Also, pre-professional students (especially students focused toward pharmacy or dentistry school) are accepted early into their respective professional programs and will show in the database as not being retained.

Previous Program Review Results

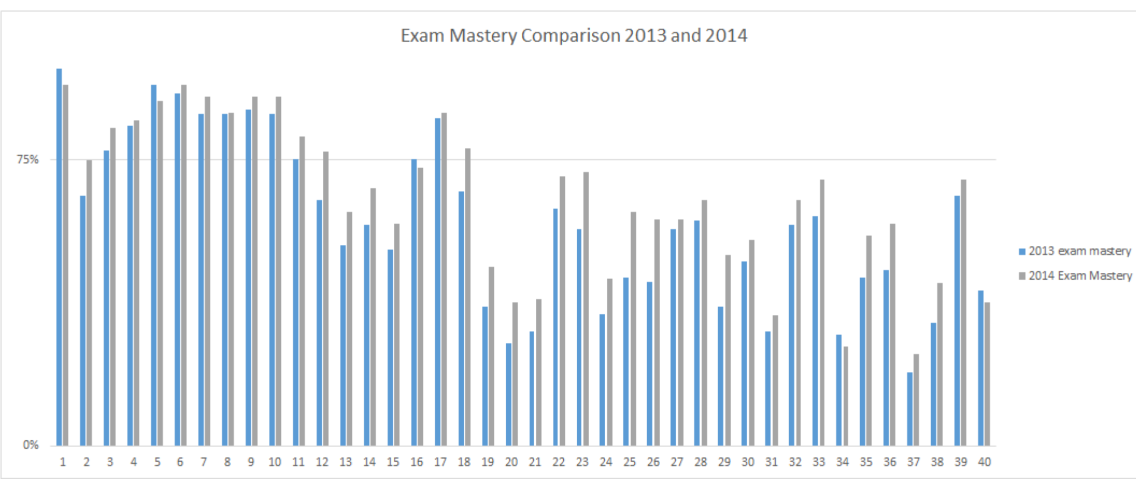
The last program review was submitted during the spring of 2013 and the program was recommended for continuation at the current level of activity. Our improvement in attracting and retaining students was noted, as was our assessment work and our adjustment of curriculum and student outcomes to address programmatic needs. The success of our graduates in obtaining employment in WV or seeking additional education via graduate school was cited positively, and our continuation was highly recommended by our Dean.

As indicated earlier in this review, chemistry and chemical education majors during the fall and spring semesters of the academic years of 2012 – 2017 averaged 36 students, about the same as the previous 5-year period. Meanwhile the number of graduates increased from 5.8 for 2007-12 to 7.8 for 2012-17.

We attribute our steady production and increase in chemistry majors to an increased flexibility in course sequencing, efforts to improve student success in our first-year courses, an increased interest in chemistry from the pre-professional students, our maintenance of program approval by the American Chemical Society, and the availability of good jobs and graduate/professional study opportunities for chemistry majors. Our program undertook a major curriculum revision with the advent of new ACS curriculum guidelines, and with input from our Dean, our Provost and our Advisory Board. One substantive goal was to attract more chemistry majors from our large pre-professional population by making the first year obviously relevant to their biochemical interests. We also were excited about the opportunity to let students take different paths through the program. We have lost students in the past because there were so many stacked courses to take and they didn't realize they were interested in chemistry until their second or third year in college. The new curriculum was formally put in place for the 2012-13 academic year and has been in place with some minor course corrections for the entire period covered by this review.

As shown in the table below, introduction of peer mentors to assist in CHEM 1105 resulted in substantially more "B" grades and lower numbers of D and F grades. Also, mastery of each learning outcome increased from 2013 to 2014 with the introduction of peer mentors. No other changes were made to the courses, exams, or instructors during this time period.

CHEM 1105 Grade Distribution (Peer Mentors)		
Final grade	**2013**	**2014**
A	14	15
B	14	29
C	30	28
D	17	10
F	18	13
W	8	10



ADEQUACY (§ 4.2.4.2)

Program Requirements:			
	Allowed	Chemistry Program	Comments
General Studies	>30 hours	42-45 hours	
Major		57-59 hours	
Electives		16-21 hours	
TOTAL	Maximum 120 hours	120 hours	
Programs not meeting the above requirements must request a continuation of their exception with a justification below:			

Faculty Data

Courses taught by full time faculty are summarized in Table 10.

Full Time Faculty Data sheets are attached in Appendix II.

Several departmental faculty members are actively engaged in the scholarship of teaching and retention, including National Science Foundation-supported development of programs for increasing retention in rural, first generation STEM majors, innovative teaching materials and strategies such as outcome-based learning, and intercollegiate online learning communities. They also are active in scientific research with undergraduates. During the past 5 years, chemistry faculty have also established research collaborations with colleagues at Fairmont State, WVU, Caltech, University of Wisconsin and University of Wyoming, and have presented with undergraduates at numerous national, regional and statewide scientific meetings. Program faculty are campus leaders in the use of Moodle, TaskStream, and the Blackboard course management system for enhancing regular course delivery. Chemistry faculty are committed to educating secondary science teachers and consciously model best practices and alternative strategies for science instruction, including active learning, continuous assessment, group activities, problem-solving, clickers, and on-line course enhancements, such as video lectures, online homework, power point presentations, and discussions.

The chemistry department has made a concerted effort to improve the laboratory space over the past five years, This has resulted in a major lab clean up and reallocation of space to accommodate research and new curricular initiatives. We continue to upgrade our instrumentation primarily through grant writing and have recently obtained: an Avantes fiber optic fluorometer, an Ocean

Optics USB400 UV-Vis spectrometer, a Pine electrochemical station, and (in the fall of 2017) obtained funding for an atomic absorption spectrometer. Next on our acquisition list is a gas chromatograph-mass spectrometer.

Chemistry faculty continuously update their knowledge in the field by attending workshops, conferences and lectures, and by reading the literature and applying new concepts to teaching. In addition to keeping abreast of developments in their fields, the chemistry faculty members are constantly striving to improve teaching effectiveness by supplementing material in current textbooks, using alternatives to lecture, and frequently changing textbooks and exploring electronic textbooks and learning options to gain new coverage.

The chemistry faculty also are active in professional service, serving as judges for the North Central West Virginia Science, Energy and Engineering Fair, offering activities at the Science and Engineering Challenge, and acting as moderators for the RESA Science Bowl Contest. Program faculty and students have organized visits to local schools, presented at the West Virginia Science Teachers Association annual meetings, presented workshops and talks for K-12 teachers and students and for homeschoolers, and established research collaborations involving K-12 teachers and students. Departmental faculty members are involved as officers and program chairs in the North Central West Virginia section of the American Chemical Society and other professional organizations.

Accreditation / national standards

The B.S. in Chemistry has been nationally certified by the American Chemical Society since Fall 2009 and provides a well-balanced program of courses in the major fields of chemistry, as well as mathematics and physics. A student completing this program will be a competitive candidate for graduate study or positions in industry or government agencies.

The guidelines from the ACS (Spring 2015) specify: "The American Chemical Society (ACS) promotes excellence in chemistry education for undergraduate students through approval of baccalaureate chemistry programs. […] Approved programs offer their students a broad-based and rigorous chemistry education that provides them with the intellectual, experimental, and communication skills to participate effectively as scientific professionals. Offering such a rigorous program requires an energetic and accomplished faculty, a modern and well-maintained infrastructure, and a coherent chemistry curriculum that incorporates modern pedagogical approaches."

In this context, the chemistry program is realizing that to continue to meet the ACS guidelines we need to strengthen our infrastructure by

- replacing and updating instrumentation
- ensuring continued access to ACS-specified journals
- ensuring continued access to Chemical Abstracts (through e.g. SciFinder)
- improving fume hood adequacy and basic physical maintenance in the building

NECESSITY (§ 4.1.3.3)

Placement – Similar Programs in WV

Other institutions of higher education within 50 miles that offer a similar degree include West Virginia Wesleyan College, Alderson-Broaddus College, David and Elkins College, Glenville State College and West Virginia University. The first three are private; consequently, many West Virginia students, both traditional and non-traditional, cannot afford them. In addition, only WVU and FSU offer chemistry degrees approved by the American Chemical Society. WVU is the state's largest public supported institution. Thus the chemistry degree program at Fairmont State University is the only one in North Central West Virginia that is affordable, regularly-offered, ACS-approved and provided in a small college atmosphere.

Tracking of graduates is summarized in Table 6 on page 25.

CONSISTENCY WITH MISSION (§ 4.1.3.4)

Explain how this program fits into the mission of the institution. Identify the relationship of this program to other programs at the institution, especially in terms of mutual support (e.g., shared faculty, shared facilities, shared course requirements for external program accreditation).

Fairmont State University Mission Statement: The Mission of Fairmont State University is to provide opportunities for individuals to achieve their professional and personal goals and discover roles for responsible citizenship that promote the common good.

Fairmont State University Vision Statement: Fairmont State University aspires to be nationally recognized as a model for accessible learner-centered institutions that promote student success by providing comprehensive education and excellent teaching, flexible learning environments, and superior services. Graduates will have the knowledge, skills, and habits of mind necessary for intellectual growth, full and participatory citizenship, employability, and entrepreneurship in a changing environment.

College of Science and Technology Mission is to promote effective student learning in science, math and technology and to prepare top-quality graduates for their future endeavors, including graduate study, employment or other personal goals.

Chemistry Program Mission:

The mission of the Chemistry Program at Fairmont State is to help students learn chemistry, and how it connects to computers, mathematics, biology and physics. We expect and encourage our students to develop the analytical, experimental and problem-solving skills necessary to successfully pursue chemistry and other science-based careers.

The chemistry program supports several important aspects of the mission and vision of Fairmont

State University and the College of Science and Technology. The university maintains a strong baccalaureate program in which the Bachelor of Science degree in chemistry has historically played, and continues to play an important role. The chemistry program produces broadly educated graduates who serve the immediate region, the state and the nation in a variety of professional roles; e.g., Ph.D., M.S., and B.S., chemists, physicians, pharmacists, lawyers, etc. The program offers a variety of chemistry courses to help fulfill a need for scientifically educated professionals in scientific and non-scientific disciplines. Our chemistry teaching specialization supports the historically strong program in secondary education at Fairmont State University. The chemistry minor and the biotechnology area of emphasis both provide strong chemistry backgrounds for students pursuing other majors.

The chemistry program has adopted a highly learner-centered curriculum, with all courses structured around explicitly defined student learning outcomes. Our use of extensive online support, group work, formal and informal peer tutoring and peer mentoring, and hands-on activities in our courses increases flexibility and supportiveness of learning environments. Most of the chemistry faculty are actively involved as mentors for student scholarship and research, and faculty/student teams travel regularly to professional conferences and talks. Our students and graduates are high achievers, and demonstrate a strong desire to give back, both to Fairmont State and to their communities.

The chemistry faculty, staff, students, facilities, and equipment are constantly interacting with other programs in the College of Science and Technology and in other schools and institutions, including Pierpoint Community and Technical College; e.g. forensics, biology, physics, science education, mathematics, nursing, medical laboratory technology, medical records technology, veterinary technology, physical therapy assisting, airway science technology, civil engineering technology, occupational safety, pre-professional studies (including pre-medicine, pre-pharmacy, pre-dental, pre-physical therapy, pre-engineering, pre-medical technology) and others.

Student clubs (for example Solar Army Student Club and the American Chemical Society Student Affiliates Club) are advised by chemistry program faculty. Students in both clubs have traveled to high schools in the local area to conduct workshops and chemical demonstrations, and have participated in numerous outreach activities on and off campus (Exploration Days, Maroon and White Day, regional and state science fairs, WV Science Teachers Association conference, etc.). These outreach activities have a two-fold purpose; not only do the high school students get interested in chemistry, they also get to meet our wonderful students who are our best ambassadors to the community.

Appendix I: Data Tables

Table Index		
Table		Source
Table 1	Program Majors – Number by Term	201310 to 201630 majors
Table 2	Program Graduates – Number by Year	Hand entered
Table 3	Program Total Course Enrollments	201310 to 201730 Cour_Sect_enr Natural Sciences
Table 4	Service Course Enrollments	201310 to 201730 Cour_Sect_enr Natural Sciences
Table 5	Service course success rates	NatSci Grade Distrubution 2012-2017
Table 6	List of graduates	Hand entered
Table 7	Courses taught on and off campus	201310 to 201730 Cour_Sect_enr Natural Sciences
Table 8	Program goals	Hand entered
Table 9	ETS results	Hand entered
Table 10	Adjunct use	201310 to 201730 Cour_Sect_enr Natural Sciences
Table 11	List of courses taught by FT faculty	201310 to 201730 Cour_Sect_enr Natural Sciences

Table 1 Chemistry Program Majors		
Primary Major	Term	Total
Chemistry	Fall Semester 2012	40
	Spring Semester 2013	33
	Fall Semester 2013	34
	Spring Semester 2014	32
	Fall Semester 2014	31
	Spring Semester 2015	34
	Fall Semester 2015	33
	Spring Semester 2016	30
	Fall Semester 2016	*
	Spring Semester 2017	*
Education with Chemistry Certification	Fall Semester 2012	6
	Spring Semester 2013	3
	Fall Semester 2013	2
	Spring Semester 2014	3
	Fall Semester 2014	2
	Spring Semester 2015	1
	Fall Semester 2015	1
	Spring Semester 2016	2
	Fall Semester 2016	*
	Spring Semester 2017	*

* Data requested; not available.

Table 2 Chemistry Graduates – Number by Year			
Academic Year	Chemistry	Education with Chemistry Certification	Total
2012-13	6	1	7
2013-14	7	2	9
2014-15	9	1	10
2015-16	5	0	5
2016-17	7	1	8
Grand Total	34	5	39

Table 3 Chemistry Program Total Course Enrollments													
	2012-2013		2013-2014		2014-2015			2015-2016		2016-2017			
Course	Fall	Spring	Fall	Spring	Fall	Spring	Sum	Fall	Spring	Fall	Spring	Sum	Total
1105 Chemical Principles	124		104		123			85		106			542
1105 Chemical Principles-Honors	21		25		17			34		13			110
2200 Foundational Biochemistry		56		65		65			63		59		308
2201 Organic Chemistry I	40		34		37		13	31		44			199
2202 Organic Chemistry II		24		23		23	11		15		28		124
2205 Analytical Chemistry		17		17		18			20		10		82
3301 Physical Chemistry I	8		21		4			16		4			53
3304 Inorganic Chemistry			28					28					56
3315 Instrumental Analysis	8		8		11			10		15			52
4401 Independent Study	1	1	4	1						1		4	12
4402 Internship								1					1
4404 Synthetic Methods & Materials	16				14					12			42
4412 Physical Chemistry II				18					13				31
4998 Undergraduate Research		1		4	5	5		1	6	6	6		34
4998 Undergraduate Research-Honor			2	2	1	1		8	6	7	3		30
Grand Total	**218**	**99**	**226**	**130**	**212**	**112**	**24**	**214**	**123**	**208**	**106**	**4**	**1676**

Table 4 Service Course Total Enrollments															
	2012-2013			2013-2014			2014-2015			2015-2016			2016-2017			
Course	F	Sp	Su	F	Sp	Su	F	Sp	Su	F	Sp	Su	F	Sp	Su	Total
CHEM 1101 General Chemistry I	179	101	35	153	96	10	119	81	14	93	75	27	122	85	14	1204
CHEM 1101 General Chemistry I-Online					18			18			40			23		99
CHEM 1102 General Chemistry II		59	37		55	10		55	15		44	14		43	12	344
Grand Total	**179**	**160**	**72**	**153**	**169**	**20**	**119**	**154**	**29**	**93**	**159**	**41**	**122**	**151**	**26**	**1647**

Service Couse Success Rates – CHEM courses
Pass(A,B,C,D) vs. Fail (W,F,I,NR)

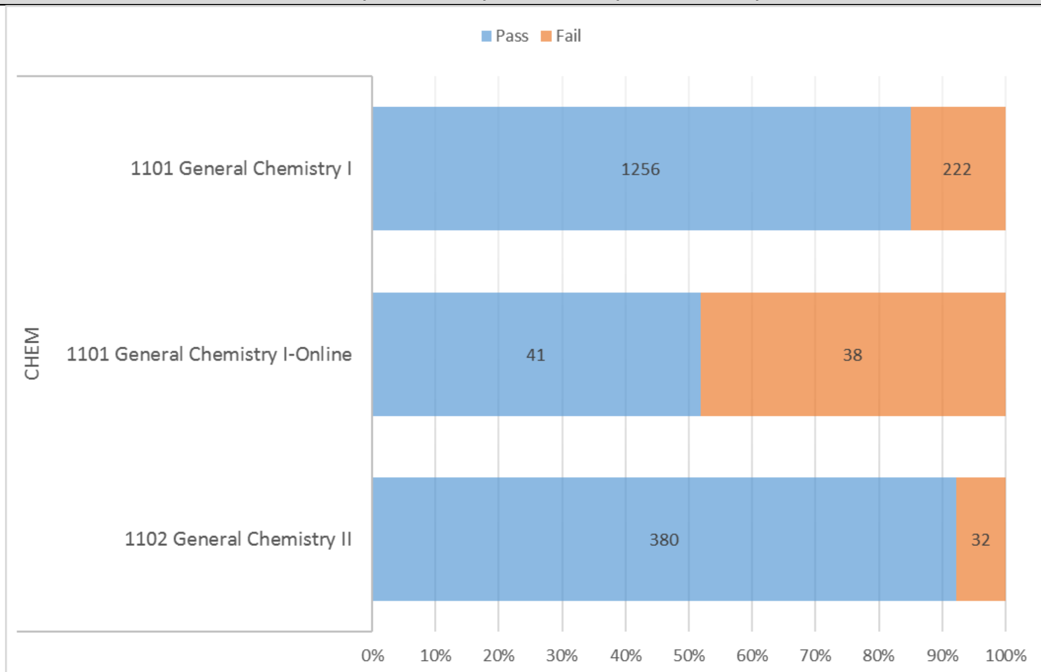


Table 6
Chemistry Program Graduates

Graduation Semester	Degree	Current Status
S17	BA Ed.	Fairmont Senior High School
S17	BS	Music Librarian (Fairmont State)
S17	BS	Mylan Pharmaceuticals
S17	BS	First Energy (Mount Storm)
S17	BS	LyondellBasell (Cincinnati)
S17	BS	Chemistry graduate school (University of Colorado Boulder)
F16	BS	Chemistry graduate school (Virginia Tech)
F16	BS	Education graduate school (Fairmont State)
S16	BS	Chemistry graduate school (Univ of South Carolina)
S16	BS	Biochemistry graduate school (Scripps Research Institute)
S16	BS	WVU Medical School
S16	BS	Marshall Medical School
S16	BS	Sam's club (family constraints)
S15	BA Ed.	unknown
S15	BS	Teaching English in Korea/Travel
F14	BS	Math graduate school Florida State
F14	BS	Advanced Analytical Solutions
F14	BS	The Chemours Company (formerly Dupont)
F14	BS	Cracker Barrel
F14	BS	Mylan Pharmaceuticals
F14	BS	unknown
F14	BS	Johnson Matthey Catalysts
F14	BS	Chemistry graduate school Texas A&M
S14	BA Ed.	Preston High School
S14	BS	unknown
S14	BS	Mylan Pharmaceuticals
S14	BS	Chemistry graduate school WVU
S14	BS	Chemistry graduate school WVU
S14	BS	not seeking employment
S14	BS	Health issues/not seeking employment
S14	BS/BA	Morgantown High School
S13	BA Ed.	Elkins High School
2013	BS	ArcelorMittal
2013	BS	Mylan Pharmaceuticals
2013	BS	Mylan Pharmaceuticals
2013	BS	Stockmeier Polyurethanes
2013	BS	WVU Pharmacy School
2013	BS	WVU Pharmacy School

Table 7 On Campus and off Campus Course Enrollment		
CAMPUS	**Course**	**Enrollment**
Fairmont	CHEM 1101 General Chemistry I	1204
	CHEM 1102 General Chemistry II	344
	CHEM 1105 Chemical Principles	542
	CHEM 1105 Chemical Principles-Honors	110
	CHEM 2200 Foundational Biochemistry	308
	CHEM 2201 Organic Chemistry I	199
	CHEM 2202 Organic Chemistry II	124
	CHEM 2205 Analytical Chemistry	82
	CHEM 3301 Physical Chemistry I	53
	CHEM 3304 Inorganic Chemistry	56
	CHEM 3315 Instrumental Analysis	52
	CHEM 4401 Independent Study	8
	CHEM 4402 Internship	1
	CHEM 4404 Synthetic Methods & Materials	42
	CHEM 4412 Physical Chemistry II	31
	CHEM 4998 Undergraduate Research	34
	CHEM 4998 Undergraduate Research-Honors	30
Fairmont Total		**3220**
High School Dual Enrollment	CHEM 1101 General Chemistry I	31
	CHEM 1102 General Chemistry II	24
High School Dual Enrollment Total		**55**
Lewis County	CHEM 1101 General Chemistry I	40
Lewis County Total		**40**
Monongalia County	CHEM 1101 General Chemistry I	146
Monongalia County Total		**146**

Virtual On-Line Campus	CHEM 1101 General Chemistry I-Online	99
	CHEM 4401 Independent Study	4
Virtual On-Line Campus Total		**103**
Grand Total		**3564**

Table 8: Chemistry (B. S.) Assessment Plan (from 2016/17 cycle)

Mission Statement

The mission of the Chemistry Program at Fairmont State is to help students learn chemistry, and how it connects to computers, mathematics, biology and physics. We expect and encourage our students to develop the analytical, experimental and problem-solving skills necessary to successfully pursue chemistry and other science-based careers. (program mission webpage: http://www.fairmontstate.edu/collegeofscitech/academics/department-natural-sciences (last access 9/25/17)

B. S. Chemistry Program Goals

The chemistry program aspires to:

B. S. Chemistry Program Goal 1

Maintain approval by the American Chemical Society.

Measure: ACS Reports

Details/Description: CPT accepted our annual report from the previous year. (always due in August)

B. S. Chemistry Program Goal 2

Ensure that graduates find employment or get accepted to graduate or professional schools.

Measure: Graduate Tracking

Details/Description: The program maintains records concerning placement of graduates into graduate or professional schools or finding of jobs for those actively seeking work.

B. S. Chemistry Program Outcomes

Upon successful completion of this program, students will be able to:

B. S. Chemistry Program Outcome 1

Demonstrate competency in the laboratory skills expected of a practicing chemist.

Measure: Faculty Evaluation of Student Laboratory Competencies

Details/Description: Faculty assess student's laboratory competencies in chemistry courses (Chem 2205, 3301 3304, 3315, 4404, 4412, Biol 3360) using a general programmatic rubric.

B. S. Chemistry Program Outcome 2

Demonstrate foundational knowledge needed by chemical professionals.

Measure: Diagnostic of Undergraduate Chemistry Knowledge (Standardized ACS Exam)

Details/Description: Performance on the standardized exam.

Measure: ETS Major Field Test

Details/Description: Performance on ETS tests

B. S. Chemistry Program Outcome 3

Apply foundational knowledge to analyze complex problems.

Measure: Analytical Non-linear least squares Assignment

Details/Description: Students in Chem 2205 (Analytical Chemistry) are required to obtain a titration curve for a diprotic acid, and model it with excel solver, to perform a non-linear least squares fit. Out of this they obtain the acid dissociation constants.

Measure: Green Chemistry Challenge

Details/Description: Chem 4404 (Synthetic Methods and Materials) Green Chemistry Challenge

B. S. Chemistry Program Outcome 4

Competently access, evaluate and learn new chemical information and skills.

Measure: Green Chemistry Challenge

Details/Description: CHEM 3315 Instrumental Analysis. Take-home exam on determining pH from Beer's Law can demonstrate the learning of new information.

Measure: STN/Plan of Procedure

Details/Description: Chem 4404 - Students will retrieve synthetic procedures from the primary literature and prepare a detailed plan of procedure

Table 9: ETS Major Field Tests

	Total Score	Pchem	Ochem	InChem	AnalyChem
2011-2017					
average	148	48	47	53	48
ETS mean	148	48	48.3	48.3	48
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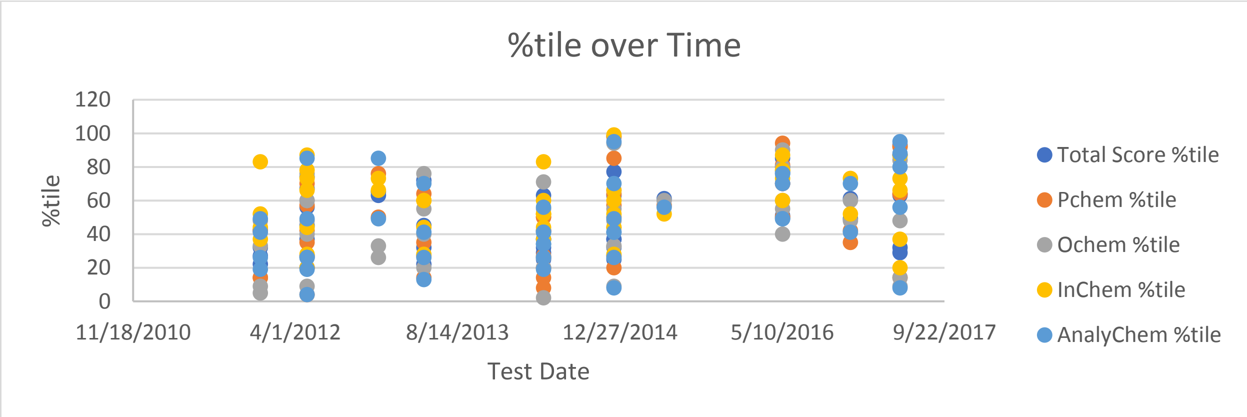
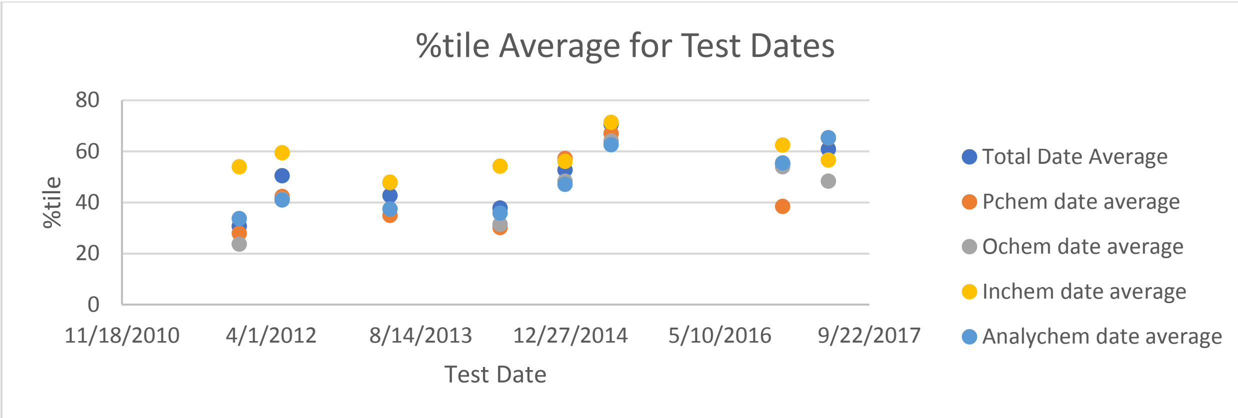


Diagram 1: A graphical representation of the distribution of individual percentile subscores based on the test dates of different student cohorts.



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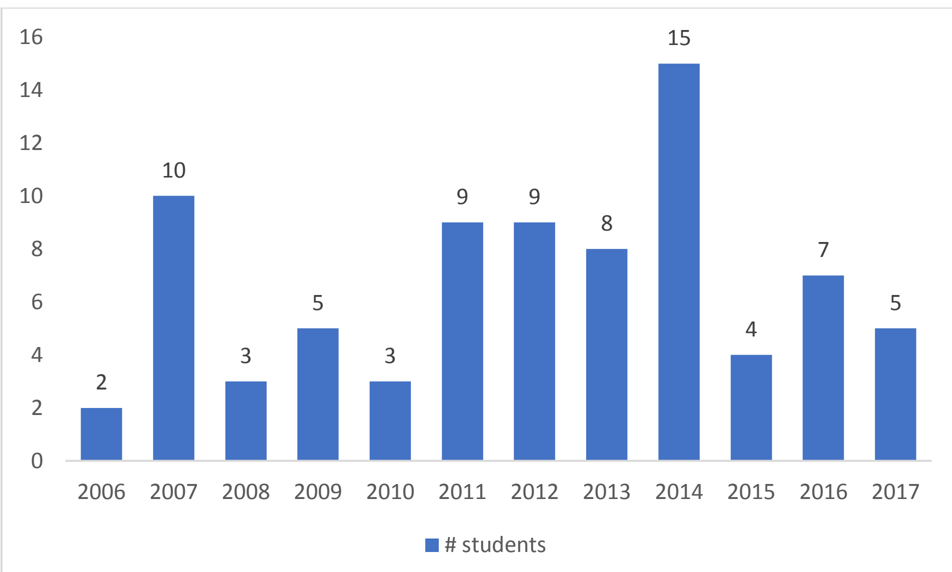

Diagram 3: Number of chemistry graduates by graduation year.

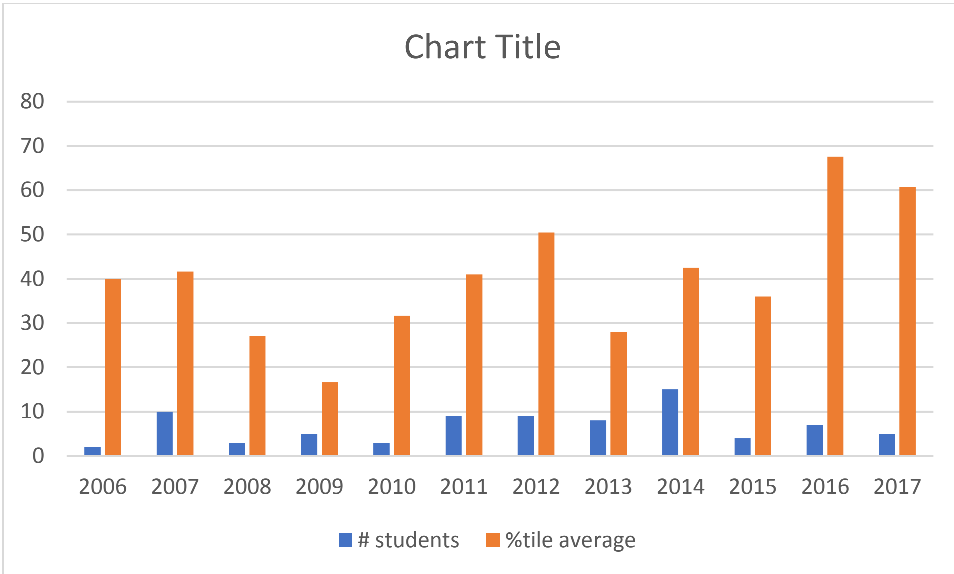

Diagram 4: Number of chemistry graduates and the corresponding average score on the ETS Major Field Test in Chemistry by year.

Table 10 Enrollments in Courses Taught by Full and Part Time Faculty			
EMPLOYEE CLASS	INSTRUCTOR	course	Enrollment
12 Month Faculty Administrator	Miller, Travis	CHEM 4401 Independent Study	2
	Miller, Travis Total		2
	Trisel, Donald	CHEM 4998 Undergraduate Research	11
		CHEM 4998 Undergraduate Research-Honors	1
	Trisel, Donald Total		12
12 Month Faculty Administrator Total			14
9, 10, or 11 Month Faculty	Baker, J	CHEM 1105 Chemical Principles-Honors	17
		CHEM 4998 Undergraduate Research-Honors	6
	Baker, J Total		23
	Baur, Andreas	CHEM 1101 General Chemistry I	24
		CHEM 2201 Organic Chemistry I	168
		CHEM 2202 Organic Chemistry II	109
		CHEM 3304 Inorganic Chemistry	28
		CHEM 4401 Independent Study	1
		CHEM 4404 Synthetic Methods & Materials	42
		CHEM 4998 Undergraduate Research-Honors	1
	Baur, Andreas Total		373
	Baxter, Harry	CHEM 1101 General Chemistry I	533
		CHEM 1102 General Chemistry II	142
	Baxter, Harry Total		675
	Gilberti, Anthony	CHEM 4998 Undergraduate Research	5
		CHEM 4998 Undergraduate Research-Honors	1
	Gilberti, Anthony Total		6
	Hahn, David	CHEM 1101 General Chemistry I-Online	20
		CHEM 1105 Chemical Principles	23
	Hahn, David Total		43
	Harvey, Erica	CHEM 1101 General Chemistry I	84
		CHEM 1101 General Chemistry I-Online	20
		CHEM 1102 General Chemistry II	24
		CHEM 1105 Chemical Principles	270
		CHEM 1105 Chemical Principles-Honors	93
		CHEM 2200 Foundational Biochemistry	308
		CHEM 2205 Analytical Chemistry	17
		CHEM 3301 Physical Chemistry I	53

		CHEM 3304 Inorganic Chemistry	28
		CHEM 4401 Independent Study	3
		CHEM 4402 Internship	1
		CHEM 4412 Physical Chemistry II	31
		CHEM 4998 Undergraduate Research	18
		CHEM 4998 Undergraduate Research-Honors	21
	Harvey, Erica Total		971
	Scanlon, Matthew	CHEM 1101 General Chemistry I	62
		CHEM 1101 General Chemistry I-Online	59
		CHEM 1102 General Chemistry II	15
		CHEM 1105 Chemical Principles	249
		CHEM 2201 Organic Chemistry I	31
		CHEM 2202 Organic Chemistry II	15
		CHEM 2205 Analytical Chemistry	65
		CHEM 3315 Instrumental Analysis	42
		CHEM 4401 Independent Study	1
	Scanlon, Matthew Total		539
	Weekley, James	CHEM 1101 General Chemistry I	14
		CHEM 1102 General Chemistry II	49
		CHEM 3315 Instrumental Analysis	10
		CHEM 4401 Independent Study	5
		CHEM 4998 Undergraduate Research	0
	Weekley, James Total		78
9, 10, or 11 Month Faculty Total			2708
PT Faculty	Church, Anna	CHEM 1101 General Chemistry I	14
	Church, Anna Total		14
	Ely, Melissa	CHEM 1101 General Chemistry I	18
	Ely, Melissa Total		18
	Gear, Charles	CHEM 1101 General Chemistry I	19
	Gear, Charles Total		19
	Lynch, John	CHEM 1101 General Chemistry I	40
	Lynch, John Total		40
	McDaniel, Robert	CHEM 1101 General Chemistry I	44
	McDaniel, Robert Total		44
	Murray, Kelly	CHEM 1101 General Chemistry I	70
	Murray, Kelly Total		70
	Sampson, Madeline	CHEM 1101 General Chemistry I	91

		CHEM 1102 General Chemistry II	114
	Sampson, Madeline Total		205
	Schneider, Joetta	CHEM 1101 General Chemistry I	12
		CHEM 1102 General Chemistry II	13
	Schneider, Joetta Total		25
	Tennant, John	CHEM 1102 General Chemistry II	11
	Tennant, John Total		11
	Williams, Jackie	CHEM 1101 General Chemistry I	396
	Williams, Jackie Total		396
PT Faculty Total			842
Grand Total			3564

Table 11
Courses Taught by Full Time Faculty – By Term

Instructor	Term	Course	Enrollment
Baur, Andreas	201310	CHEM 2201 Organic Chemistry I	40
		CHEM 2201 Organic Chemistry I Lab	20
		CHEM 2201 Organic Chemistry I Test Lab	39
		CHEM 4404 Synthc Methods & Materials Lab	16
		CHEM 4404 Synthetic Methods & Materials	16
	201320	BIOL 3360 Biochemistry	16
		CHEM 2202 Organic Chemistry II	24
		CHEM 2202 Organic Chemistry II Lab	18
		CHEM 2202 Organic Chemistry II Test Lab	24
		CHEM 2205 Analytical Chemistry Lab	11
	201410	CHEM 2201 Organic Chemistry I	34
		CHEM 2201 Organic Chemistry I Lab	9
		CHEM 2201 Organic Chemistry I Test Lab	34
		CHEM 3304 Inorganic Chemistry	28
		CHEM 3304 Inorganic Chemistry Lab	18
	201420	BIOL 3360 Biochemistry	21
		BIOL 3360 Biochemistry Lab	9
		CHEM 2202 Organic Chemistry II	23
		CHEM 2202 Organic Chemistry II Lab	19
		CHEM 2202 Organic Chemistry II Test Lab	23
	201430	CHEM 1101 General Chemistry I	10
	201510	CHEM 2201 Organic Chemistry I	37
		CHEM 2201 Organic Chemistry I Lab	9
		CHEM 2201 Organic Chemistry I Test Lab	37
		CHEM 4404 Synthc Methods & Materials Lab	14
		CHEM 4404 Synthc Methods & Materials Test Lab	14
		CHEM 4404 Synthetic Methods & Materials	14
	201520	BIOL 3360 Biochemistry	19
		BIOL 3360 Biochemistry Lab	10
		CHEM 2202 Organic Chemistry II	23
		CHEM 2202 Organic Chemistry II Lab	16
		CHEM 2202 Organic Chemistry II Test Lab	23
	201530	CHEM 2201 Organic Chemistry I	13
		CHEM 2202 Organic Chemistry II	11
	201710	CHEM 2201 Organic Chemistry I	44
		CHEM 2201 Organic Chemistry I Lab	12
		CHEM 2201 Organic Chemistry I Test Lab	44
		CHEM 4401 Independent Study	1
		CHEM 4404 Synthc Methods & Materials Lab	12
		CHEM 4404 Synthc Methods & Materials Test Lab	12
		CHEM 4404 Synthetic Methods & Materials	12
		CHEM 4998 Undergraduate Research-Honors	1

	201720	BIOL 3360 Biochemistry	30
		BIOL 3360 Biochemistry Lab	21
		CHEM 2202 Organic Chemistry II	28
		CHEM 2202 Organic Chemistry II Lab	11
		CHEM 2202 Organic Chemistry II Test Lab	28
	201730	CHEM 1101 General Chemistry I	14
Baur, Andreas Total			**962**
Baxter, Harry	201310	CHEM 1101 General Chemistry I	91
		CHEM 1101 General Chemistry I Lab	61
	201320	CHEM 1101 General Chemistry I	73
		CHEM 1101 General Chemistry I Lab	20
		CHEM 1102 General Chemistry II Lab	38
	201410	CHEM 1101 General Chemistry I	64
		CHEM 1101 General Chemistry I Lab	35
		CHEM 2201 Organic Chemistry I Lab	5
	201420	CHEM 1101 General Chemistry I	64
		CHEM 1101 General Chemistry I Lab	18
		CHEM 1102 General Chemistry II Lab	34
	201510	CHEM 1101 General Chemistry I	75
		CHEM 1101 General Chemistry I Lab	20
		CHEM 2201 Organic Chemistry I Lab	18
	201520	CHEM 1101 General Chemistry I Lab	13
		CHEM 1102 General Chemistry II	55
		CHEM 1102 General Chemistry II Lab	35
	201610	CHEM 1101 General Chemistry I	47
		CHEM 1101 General Chemistry I Lab	19
		CHEM 2201 Organic Chemistry I Lab	32
	201620	CHEM 1101 General Chemistry I	39
		CHEM 1101 General Chemistry I Lab	19
		CHEM 1102 General Chemistry II	44
		CHEM 2202 Organic Chemistry II Lab	15
	201710	CHEM 1101 General Chemistry I	80
		CHEM 1101 General Chemistry I Lab	59
	201720	CHEM 1101 General Chemistry I Lab	16
		CHEM 1102 General Chemistry II	43
		CHEM 1102 General Chemistry II Lab	27
Baxter, Harry Total			1159
Gilberti, Anthony	201310	PHYS 1105 Principles of Physics Test Lab	6
	201320	CHEM 4998 Undergraduate Research	1
		SCIE 1120 Intro to Meteorology-Online	9
	201410	CHEM 4998 Undergraduate Research	0
	201420	BIOL 4998 Undergraduate Research	1
		CHEM 4998 Undergraduate Research	4
		CHEM 4998 Undergraduate Research-Honors	1
Gilberti, Anthony Total			22
Hahn, David	201610	CHEM 1101 General Chemistry I Lab	17

		CHEM 1105 Chemical Principles	23
		CHEM 1105 Chemical Principles Lab	29
	201620	CHEM 1101 General Chemistry I-Online	20
		CHEM 1102 General Chemistry II Lab	8
		CHEM 2200 Foundational Biochemistry Lab	30
Hahn, David Total			127
Harvey, Erica	201310	CHEM 1105 Chemical Principles	64
		CHEM 1105 Chemical Principles Lab	115
		CHEM 1105 Chemical Principles-Honors	21
		CHEM 3301 Physical Chemistry I	8
	201320	CHEM 2200 Foundational Biochem Test Lab	56
		CHEM 2200 Foundational Biochemistry	56
		CHEM 2205 Analytical Chemistry	17
		CHEM 2205 Analytical Chemistry Test Lab	17
	201410	CHEM 1105 Chemical Principles	54
		CHEM 1105 Chemical Principles-Honors	25
		CHEM 3301 Physical Chemistry I	21
		CHEM 4401 Independent Study	1
	201420	CHEM 2200 Foundational Biochem Test Lab	65
		CHEM 2200 Foundational Biochemistry	65
		CHEM 4412 Physical Chemistry II	18
	201430	CHEM 1102 General Chemistry II	10
	201510	CHEM 1105 Chemical Principles	68
		CHEM 1105 Chemical Principles-Honors	17
		CHEM 3301 Physical Chemistry I	4
		CHEM 4998 Undergraduate Research-Honors	1
	201520	CHEM 1101 General Chemistry I	41
		CHEM 2200 Foundational Biochem Test Lab	65
		CHEM 2200 Foundational Biochemistry	65
	201610	CHEM 1105 Chemical Principles	27
		CHEM 1105 Chemical Principles-Honors	17
		CHEM 3301 Physical Chemistry I	16
		CHEM 3304 Inorganic Chemistry	28
		CHEM 4402 Internship	1
		CHEM 4998 Undergraduate Research	0
		CHEM 4998 Undergraduate Research-Honors	5
	201620	CHEM 1101 General Chemistry I-Online	20
		CHEM 2200 Foundational Biochem Test Lab	63
		CHEM 2200 Foundational Biochemistry	63
		CHEM 4412 Physical Chemistry II	13
		CHEM 4998 Undergraduate Research	6
		CHEM 4998 Undergraduate Research-Honors	6
	201630	CHEM 1102 General Chemistry II	14
	201710	CHEM 1105 Chemical Principles	57
		CHEM 1105 Chemical Principles-Honors	13
		CHEM 3301 Physical Chemistry I	4

		CHEM 4998 Undergraduate Research	6
		CHEM 4998 Undergraduate Research-Honors	6
	201720	CHEM 1101 General Chemistry I	43
		CHEM 2200 Foundational Biochem Test Lab	59
		CHEM 2200 Foundational Biochemistry	59
		CHEM 4998 Undergraduate Research	6
		CHEM 4998 Undergraduate Research-Honors	3
	201730	CHEM 4401 Independent Study	2
Harvey, Erica Total			1411
Scanlon, Matthew	201310	CHEM 1105 Chemical Principles	60
		CHEM 1105 Chemical Principles Lab	115
		CHEM 3301 Physical Chemistry I Lab	8
		CHEM 3315 Instrumental Analysis	8
		CHEM 3315 Instrumental Analysis Lab	8
		CHEM 3315 Instrumental Analysis Test Lab	8
	201330	CHEM 1101 General Chemistry I	35
	201410	CHEM 1105 Chemical Principles	50
		CHEM 3301 Physical Chemistry I Lab	11
		CHEM 3315 Instrumental Analysis	8
		CHEM 3315 Instrumental Analysis Lab	8
		CHEM 3315 Instrumental Analysis Test Lab	8
		CHEM 4401 Independent Study	1
	201420	CHEM 1101 General Chemistry I-Online	18
		CHEM 2205 Analytical Chemistry	17
		CHEM 2205 Analytical Chemistry Test Lab	17
		CHEM 4412 Physical Chemistry II Lab	18
	201510	CHEM 1105 Chemical Principles	55
		CHEM 3301 Physical Chemistry I Lab	4
		CHEM 3315 Instrumental Analysis	11
		CHEM 3315 Instrumental Analysis Lab	11
		CHEM 3315 Instrumental Analysis Test Lab	11
	201520	CHEM 1101 General Chemistry I-Online	18
		CHEM 2205 Analytical Chemistry	18
		CHEM 2205 Analytical Chemistry Lab	18
		CHEM 2205 Analytical Chemistry Test Lab	18
	201530	CHEM 1102 General Chemistry II	15
	201610	CHEM 1105 Chemical Principles	35
		CHEM 2201 Organic Chemistry I	31
		CHEM 2201 Organic Chemistry I Test Lab	31
		CHEM 3301 Physical Chemistry I Lab	14
	201620	CHEM 2202 Organic Chemistry II	15
		CHEM 2202 Organic Chemistry II Test Lab	15
		CHEM 2205 Analytical Chemistry	20
		CHEM 2205 Analytical Chemistry Lab	10
		CHEM 2205 Analytical Chemistry Test Lab	20
		CHEM 4412 Physical Chemistry II Lab	13

	201630	CHEM 1101 General Chemistry I	27
	201710	CHEM 1105 Chemical Principles	49
		CHEM 3301 Physical Chemistry I Lab	4
		CHEM 3315 Instrumental Analysis	15
		CHEM 3315 Instrumental Analysis Lab	15
		CHEM 3315 Instrumental Analysis Test Lab	15
	201720	CHEM 1101 General Chemistry I-Online	23
		CHEM 2205 Analytical Chemistry	10
		CHEM 2205 Analytical Chemistry Lab	10
		CHEM 2205 Analytical Chemistry Test Lab	10
Scanlon, Matthew Total			959
Weekley, James	201310	CHEM 1105 Chemical Principles Lab	75
		CHEM 4401 Independent Study	1
		CHEM 4998 Undergraduate Research	0
	201320	BIOL 3360 Biochemistry Lab	9
		CHEM 2200 Foundational Biochemistry Lab	45
		CHEM 4401 Independent Study	1
	201330	CHEM 1102 General Chemistry II	37
	201410	CHEM 1105 Chemical Principles Lab	70
		CHEM 4401 Independent Study	2
	201420	CHEM 2200 Foundational Biochemistry Lab	51
		CHEM 4401 Independent Study	1
		FORS 2225 Forensic Microscpy/Spectroscpy	6
	201510	CHEM 1105 Chemical Principles Lab	74
	201520	CHEM 2200 Foundational Biochemistry Lab	65
	201530	CHEM 1101 General Chemistry I	14
	201610	CHEM 1105 Chemical Principles Lab	43
		CHEM 3315 Instrumental Analysis	10
		CHEM 3315 Instrumental Analysis Lab	10
		CHEM 3315 Instrumental Analysis Test Lab	10
	201620	CHEM 2200 Foundational Biochemistry Lab	33
		CHEM 2205 Analytical Chemistry Lab	9
		FORS 2225 Forensic Microscpy/Spectroscpy	10
	201710	CHEM 1105 Chemical Principles Lab	72
	201720	CHEM 2200 Foundational Biochemistry Lab	59
	201730	CHEM 1102 General Chemistry II	12
Weekley, James Total			719
Grand Total			5359

APPENDIX II Faculty Data

(No more than TWO pages per faculty member)

Name Andreas Baur

Rank Full Professor

Check One:Full-time X ____________________________ Part-time ______________________________

Adjunct _________________ Graduate Asst.

Highest Degree Earned Dr. rer.nat. Date Degree Received 1997

Conferred by Universität Regensburg (Germany)

Area of Specialization Organic Chemistry

Professional registration/licensure Yrs. of employment at present institution: 18
Years of employment in higher education 20 Yrs. of related experience outside higher education 0
Non-teaching experience: 1

To determine compatibility of credentials with assignment:

(a) List courses you taught this year and those you taught last year: (If you participated in team-taught course, indicate each of them and what percent of courses you taught.) For each course include year and semester taught, course number, course title and enrollment.

See Table 11

(b) If degree is not in area of current assignment, explain.

(c) Identify your professional development activities during the past five years.

Visiting Scholar, West Virginia University, Advisor: Dr. Jessica Hoover **2015 – 2016**

Professional meetings attended

- National Meeting of the American Chemical Society, Boston, MA, August **2015**
- National Meeting of the American Chemical Society, Washington, DC, August **2009**
- 20th Biennial Conference on Chemical Education, Bloomington, IN, July **2008**

(d) List awards/honors (including invitations to speak in your area of expertise) or special recognition In last five years.

William A. Boram Award for Teaching Excellence **2015**

(e) Indicate any other activities which have contributed to effective teaching.

- Mentoring of undergraduate research students (Megan Smith (2008), William Green (2008 – 2009), Christopher Matheny (2012 – 2014), Jessica Rogers (2014), Bryan Foley (2013 – 2014), Mitchell Haines (2014), Kevin Dudley (2014), Thomas Dodd (2016), Brittany Bonnett (2016-2017), Hannah Haller (2016-2018), Chelsey Makell (2017-2018)
- Self-study of new laboratory techniques and implementation into course laboratories e.g. GCMS, protein assays, PCR, cloning, protein expression and purification, reaction kinetics.
- Continuous course assessment.
- Self-study of current research articles and implementation into courses e.g. Organic Chemistry I/II, Biochemistry, Synthetic Methods and Materials.

(f) List professional books/papers published during the last five years.

PAPERS

- Baur, A.; Bustin, K. A.; Aguilera, E.; Petersen, J. L.; Hoover, J. M. "Copper and Silver Benzoate and Aryl Complexes and Their Implications for Oxidative Decarboxylative Coupling Reactions" Org. Chem. Front. **2017** DOI: 10.1039/C6QO00678G
- Gowda, A. S.; Baur, A.; Scaggs, C. A.; Petersen, J. L.; Hoover, J. M. "Formation of Urea from a Mononuclear Iron Tris(Isocyanide) Complex" Organometallics, **2016**, 35, 3720-3727.

PRESENTATIONS

- "Copper-Catalyzed Decarboxylative Coupling: Reaction Development and Mechanistic Insights" Andreas Baur, Lijun Chen, Lin Ju, Minghao Li, <u>Jessica M. Hoover</u>, Poster Presentation, Organic Reactions and Processes Gordon Research Conference, Easton, MA. July **2016**.
- "Copper-Catalyzed Decarboxylative Coupling: Reaction Development and Mechanistic Insights" Andreas Baur, Lijun Chen, Lin Ju, Minghao Li, <u>Jessica M. Hoover</u>, Poster Presentation, Organometallic Chemistry Gordon Research Conference, Newport, RI. July **2016**.
- "Determination of benzo[a]pyrene in cigarette smoke using high performance liquid chromatography with fluorescence detection" <u>Bryan Foley</u> and Andreas Baur; 248th National Meeting of the American Chemical Society, San Francisco, CA, August **2014**;
- "Identification of Rhodamine 6g and Rhodamine B Dyes in Red Pen Ink Using High-performance Liquid Chromatography with Fluorescence Detection." <u>Christopher Matheny</u> and Andreas Baur; 246th National Meeting of the American Chemical Society, Indianapolis, IN, September **2013**;
- "Serendipitously restructuring the first year chemistry experience to meet the Association of American Medical Colleges (AAMC) guidelines" <u>Erica L Harvey</u>, Matthew J Scanlon, Steven K Roof, Andreas Baur; 246 th National Meeting of the American Chemical Society, Indianapolis, IN, September 2013;
- "Synthesis of Precursors for Redox-active Imino Ligands", <u>William Green</u>, Andreas Baur, National Meeting of the American Chemical Society, Washington, DC, August **2009**;
- "Completing the Cycle: Using Outcome Mastery Data for Course Improvement", Andreas Baur, <u>Erica Harvey</u>, 20th Biennial Conference on Chemical Education, Bloomington, IN, July **2008**;

(g) List externally funded research (grants and contracts) during last five years.

EPSCoR instrumentation grant (Chemistry/Forensic Science collaboration)	**2017**
Bowers grant (Chemistry/Forensic Science collaboration)	**2017**
NASA SURE Grant	**2009**
Research Funding Development Grant	**2008**

Faculty Data

Name: Harry N. Baxter, III

Rank: Professor of Chemistry

Check One

Full-time: X Part-time: Adjunct: Graduate Asst.

Highest Degree Earned: PhD

Date Degree Received: 5/1985

Conferred by: The Pennsylvania State University

Area of Specialization: Organic Chemistry

Professional registration/licensure:

Yrs. of employment at present institution: 32

Years of employment in higher education: 32

Yrs. of related experience outside higher education: 0

Non-teaching experience: 0

To determine compatibility of credentials with assignment:
(a) List courses you taught this year and those you taught last year: (If you participated in team-taught course, indicate each of them and what percent of courses you taught.) For each course include year and semester taught, course number, course title and enrollment.

Year/Semester	Course Number & Title	Enrollment
2017/Spring	CHEM 1101 General Chemistry I Lab	16
2017/Spring	CHEM 1102 General Chemistry II (2 sections)	43
2017/Spring	CHEM 1102 General Chemistry II Lab (2 sections)	27
2016/Fall	CHEM 1101 General Chemistry I (2 sections)	80
2016/Fall	CHEM 1101 General Chemistry I Lab (3 sections)	59
2016/Spring	CHEM 1101 General Chemistry I	39
2016/Spring	CHEM 1101 General Chemistry I Lab	19
2016/Spring	CHEM 1102 General Chemistry II	44
2016/Spring	CHEM 2202 Organic Chemistry II Lab (2 sections)	15
2015/Fall	CHEM 1101 General Chemistry I	47
2015/Fall	CHEM 1101 General Chemistry I Lab	19
2015/Fall	CHEM 2201 Organic Chemistry I Lab (3 sections)	32

(b) If degree is not in area of current assignment, explain.

Identify your professional development activities during the past five years.

245th American Chemical Society National Meeting April 7-11, 2013
247th American Chemical Society National Meeting March 16-20, 2014
249th American Chemical Society National Meeting March 22-26, 2015

List awards/honors (including invitations to speak in your area of expertise) or special recognition in last five years.

none

Indicate any other activities which have contributed to effective teaching.

none

List professional books/papers published during the last five years.

none

List externally funded research (grants and contracts) during last five years.

none

Faculty Data

(No more than TWO pages per faculty member)

Name : _Erica Harvey_______Rank: Professor____

Check One: Full-time__x___ Part-time _____ Adjunct _____ Graduate Asst. _______________

Highest Degree Earned _Ph.D.___ Date Degree Received ____1990 ___________________________________

Conferred by ___California Institute of Technology ____

Area of Specialization ____Chemistry ____

Professional registration/licensure _NA__ Yrs. of employment at present institution __24_____
Years of employment in higher education __29___ Yrs. of related experience outside higher education __0____
Non-teaching experience _____

To determine compatibility of credentials with assignment:

(a) List courses you taught this year and those you taught last year: (If you participated in team-taught course, indicate each of them and what percent of courses you taught.) For each course include year and semester taught, course number, course title and enrollment.

See Table 11

(b) If degree is not in area of current assignment, explain. **N/A**

(c) Identify your professional development activities during the past five years.

- National Meeting of the American Chemical Society, Boston, MA, **August 2015**
- National Meeting of the American Chemical Society, Indianapolis, IN, **August 2013**
- South East Regional Meeting of the American Chemical Society/Solar Energy Research Conference, **2016, 2017**
- Mid-Atlantic Regional Meeting of the American Chemical Society, Hershey, PA, **June 2017**.
- Central Eastern Regional Meeting of the American Chemical Society, Covington, KY, **May 2016**.
- West Virginia Science Teachers Association Annual Conference, **2013, 2014, 2015, 2016, 2017.**
- West Virginia Academy of Sciences Annual Meeting, **2014, 2015, 2016, 2017**

(d) List awards/honors (including invitations to speak in your area of expertise) or special recognition In last five years.

- Faculty Development Award Nominee, 2017
- Invited presentation, Center for Chemical Innovation Solar Fuels Annual Conference, 2/6/16, CA.
- "Yoga in Physical Chemistry…and Other Active Learning Adventures at a Primarily Undergraduate Institution." Erica Harvey, invited lecture in Department of Chemistry at the University of Akron, Akron, OH, September 16, 2014.
- Chair, North Central WV ACS Section, 2012-13
- Straight Award Nominee, 2012.

(e) Indicate any other activities which have contributed to effective teaching.

(f) List professional books/papers published during the last five years.

1. "Molecular Dynamics Simulations as a Tool for Accurate Determination of Surfactant Micelle Properties." Sadegh Faramarzi, Brittany Bonnett*, Carl A. Scaggs*, Ashley Hoffmaster*, Danielle Grodi*, Erica Harvey, and Blake Mertz. Langmuir, 2017, 33 (38), 9934-9943. DOI: 10.1021/acs.langmuir.7b02666 (* denotes FSU undergraduate.)

Presentations, including undergraduate coauthors:

1. "Mixed metal oxides from the WV Brigade of the Solar Army." Allison Moore, Sarah Starcovic, Taleah Bailey, Travis Harding, and Erica Harvey, South East Regional Meeting of the American Chemical Society/Solar Energy Research Conference, November 9, 2017, Charlotte, NC.
2. "Scholars from the Hollers: STEM Persistence and Rural Identity." Caitlin Howley (Consultant), Sue Ann Heatherly (Green Bank Observatory), Erica Harvey, Gay Stewart (WVU), Travis Miller (FSU), Karissa Poszywak (WVDE), 80th annual meeting of the Rural Sociological Society, July 30, 2017 in Columbus, OH.
3. "Simulations of Soap." Rachel VanOsdol, Rebecca Rutherford, Sadegh Faramarzi, Blake Mertz, and Erica Harvey, Mid-Atlantic Regional Meeting of the American Chemical Society, June 4-6, 2017 in Hershey, PA.
4. Celebration of Student Scholarship, Fairmont State University, April 26, 2017. (5 presentations by 9 students)
5. West Virginia Academy of Science meeting on April 8, 2017 at Glenville State College.
    - "Improving STEM persistence in the first two years of college." Sue Ann Heatherly, Erica Harvey, Caitlin Howley.
    - "Testing Metal Oxides for Oxygen Generation Capacity with HARPOON." Sarah Starcovic, Allison Moore, Rebecca Rutherford, and Erica Harvey.
    - "The Solar Army: Novel combined airbrush/silkscreen method for finding catalysts to yield hydrogen fuel through solar energy." Dominiqe Cuccaro, Jordyn Bowers, Mike Kingston, and Erica Harvey.
    - "Molecular dynamics simulations of detergent micelles." Rebecca Rutherford, Rachel Van Osdol, Sadegh Faramarzi, Blake Mertz, and Erica Harvey.
6. "Solar Energy Storage: Uncovering the Right Stuff for the Job." Ben Wilfong, Erica Harvey, Thomas Devine, poster presented at Undergraduate Research Day at the Capitol on February 24, 2017 in Charleston, WV.
7. West Virginia Science Teachers Association 2016 Annual Conference on October 29, 2016 in Cheat Lake, WV. "Solar Army: WV Brigade." Allison Moore, Rebecca Rutherford, Annelise Williams, Sarah Starcovic, and Erica Harvey.
8. "Molecular Dynamics Investigation of Factors Influencing Self-Assembly of Detergent Molecules." Brittany Bonnett, Carl Scaggs, Lucas Freeze, Sadegh Faramarzi, Blake Mertz, and Erica Harvey, Southeastern Regional Meeting of the American Chemical Society, October 24, 2016 in Columbia, SC.
9. "Molecular Dynamics Investigation of Detergent Micelle Properties." Ashley Hoffmaster, Brittany Bonnett, Sadegh Faramarzi, Lucas Freeze, Danielle Grodi, Blake Mertz, and Erica Harvey, presented at the Central Eastern Regional Meeting of the American Chemical Society, May 18-21, 2016 in Covington, KY.
10. Celebration of Student Scholarship, Fairmont State University, April 19, 2016. (4 presentations by 9 students).
11. West Virginia Academy of Science meeting on April 9, 2016 at Marshall University.
    - "Molecular Dynamics Simulations of Detergent Micelles." Brittany Bonnett, Ashley Hoffmaster and Erica Harvey.
    - "Behind the Scenes with the Solar Army: Improvements in Sample Testing Technology." Jayce Riley, Allison Moore, Kevin Dudley and Erica Harvey.
    - "Spreading Sunlight: Connecting Communities with Solar Energy Research." Chelsea Price, Allison Moore, Kelly Humphreys, and Erica Harvey.
    - "Molecular Dynamics Simulations of Detergent Micelles." Ashley Hoffmaster, Brittany Bonnett, and Erica Harvey.
12. West Virginia Science Teachers Association 2015 Annual Conference on November 7, 2015 in Flatwoods, WV. "Hands-on with the Solar Army." Sean Harwell, Allison Moore, Jenni Perkins, and Erica Harvey.
13. "The Solar Army: West Virginia Brigade." Kevin Dudley, Jenni Perkins, Julia Oliveto, Sean Harwell, and Erica Harvey, Dept of Biology, Chemistry and Geoscience, Fairmont State University, Solar Energy Research Conference, October 15-16, 2015 in Chapel Hill, NC.
14. Solar Army presentation to Health Science Technology Academy (HSTA) advisors annual meeting at West Virginia University, 8/22/15. Sean Harwell and Erica Harvey.
15. "Molecular Dynamics Simulations of Detergent Micelles." Andrew Philpott, Ashley Hoffmaster, Danielle Grodi, Blake Mertz, and Erica Harvey, National Meeting of the American Chemical Society, August 15-19, 2015 in Boston, MA.
16. Celebration of Student Scholarship, Fairmont State University, April 22, 2015. (2 presentations, 6 students).
17. West Virginia Academy of Science meeting on April 11, 2015 at West Liberty University.
    - "Molecular Dynamics Simulations of Detergent Micelles." Andrew Philpott, Ashley Hoffmaster, Danielle Grodi and Erica Harvey
    - "Solar Army, West Virginia Brigade: Beta-testing the Solar Hydrogen Activity Research Kit (SHArK) and new techniques for metal oxide distribution." Jenni Perkins, Julia Oliveto, Sean Harwell and Erica Harvey.
18. West Virginia Science Teachers Association 2014 Annual Conference on November 8, 2014 in Glade Springs, WV. "Hands-on with the Solar Army." Jenni Perkins, Julia Oliveto and Erica Harvey.
19. "Assembling the Solar Army in West Virginia: The Search for Improved Metal Oxides for Water Splitting." Chris Matheny and Erica Harvey, poster presented at:

- West Virginia University Poster Symposium, Morgantown, WV, March 22, 2014
- West Virginia Academy of Sciences Annual Meeting, Shepherdstown, WV, April 12, 2014.

20. "The Solar Army Needs YOU!," Erica Harvey, West Virginia Science Teachers Association Annual Conference, Lakeview Resort, WV, November 1, 2013.
21. "Integrating Art and Climate Science." Sandra Cress and Erica Harvey, 2013 West Virginia Art Education Association Conference, West Liberty University, West Liberty, WV, October 25, 2013.
22. Serendipitously re-structuring the first-year chemistry experience to meet the guidelines of the Association of American Medical Colleges (AAMC). Erica L. Harvey, Matthew Scanlon, Steven Roof, and Andreas Baur. 246th ACS National Meeting, Indianapolis, IN, September 9, 2013.

(g) List externally funded research (grants and contracts) during last five years.

1. NASA Space Grant Scholars Program Awards for Students through Fairmont State University (faculty mentor)
    a. Allison Moore, Sarah Starcovic, Jessica Johnson, Ashley Ruza, Lindsey LaNeve and Rebecca Rutherford ($3000 each), Spring 2018
    b. Allison Moore ($5200), Roger Cogar ($1272), CJ Porter ($1586), Sarah Starcovic ($2596) and Ben Wilfong ($2600), Rebecca Rutherford ($6327), Spring and summer, 2017
    c. Allison Moore, Kevin Dudley, Chelsea Price, Kelly Humphreys, and Jayce Riley, ($10,133), Spring and summer, 2016.
    d. Ashley Hoffmaster, Brittany Bonnett, Carl Scaggs, and Lucas Freeze, ($8932), Spring and summer, 2016.
2. Spearheaded with undergraduate Allison Moore a fund-raising initiative for a solar library at Fairmont State, 2017.
3. EPSCoR instrumentation grant (Chemistry/Forensic Science collaboration), $20,000 2017
4. Bowers grant (Chemistry/Forensic Science collaboration), $15,000 2017
5. NSF INCLUDES project (#1649323), “FIRST TWO: Improving STEM persistence in the first two years of college.” Co-PI with Sue Ann Heatherly (Green Bank Observatory), $299,705 ($31,803 subcontract to FSU), 2016-18.
6. NASA West Virginia Space Grant Consortium Undergraduate Research Fellowship, Brittany Bonnett (faculty mentor). $5000 for summer and fall, 2016.
7. Dominion Higher Education Partnership award "Solar Powered Learning, Research and Outreach." With Don Trisel and Amantha Cole, $10,000, 2015.
8. FSU SURE (Summer Undergraduate Research Program) with Kevin Dudley and Matt Scanlon, $5500, Summer, 2015.
9. NSF EPSCoR Research Infrastructure Improvement Cooperative Agreement #1003907 administered by NanoSAFE at West Virginia University (http://nanosafe.wvu.edu), $22,600, with Ashley Hoffmaster, Andrew Philpott and Danielle Grodi. Spring and summer, 2015.
10. NASA Space Grant Consortium Faculty Research Enhancement Award. "Solar Energy Research: Computational and Laboratory-Based Projects with Undergraduates." Erica Harvey, Jenni Perkins and Julia Oliveto. $7100, Spring 2015.
11. NASA Space Grant Consortium Undergraduate Affiliate Scholarships for Danielle Grodi, Ashley Hoffmaster and Andrew Philpott, (faculty mentor). $2000 per student, 2014-15.
12. “Chemistry Merit Badge Booth at BSA National Jamboree.” Erica Harvey for NWVACS Section, ($3000), 2013.
13. “Climate Science and the Arts”. Erica Harvey, Sandra Cress for NWVACS Section, ($3000), 2013.

Faculty Data

(No more than TWO pages per faculty member)

Name : _James Weekley_______Rank: Instructor____

Check One: Full-time__x___ Part-time _____ Adjunct _____ Graduate Asst. _______________

Highest Degree Earned _M.S.___ Date Degree Received ____2005 ___________________________________

Conferred by ___University of Kentucky____

Area of Specialization ____Pharmaceutical Sciences____

Professional registration/licensure _NA__ Yrs. of employment at present institution __13_____
Years of employment in higher education __13___ Yrs. of related experience outside higher education __1____
Non-teaching experience __8___

To determine compatibility of credentials with assignment:

(a) List courses you taught this year and those you taught last year: (If you participated in team-taught course, indicate each of them and what percent of courses you taught.) For each course include year and semester taught, course number, course title and enrollment.

Year/Semester	**Course Number & Title**	**Enrollment**
See Table 9		

(b) If degree is not in area of current assignment, explain. **N/A**
(c) Identify your professional development activities during the past five years.
(d) List awards/honors (including invitations to speak in your area of expertise) or special recognition In last five years. **N/A**
(e) Indicate any other activities which have contributed to effective teaching.
(f) List professional books/papers published during the last five years.
(g) List externally funded research (grants and contracts) during last five years.

Name : __Matthew Scanlon_______________Rank: Professor__________________________________

Check One: Full-time_X____ Part-time _____ Adjunct _____ Graduate Asst. _______

Highest Degree Earned _Ph.D____________ Date Degree Received ____1988 __________________

Conferred by ____Montana State University____

Area of Specialization ____Physical Chemistry ____

Professional registration/licensure ___ Yrs. of employment at present institution_27______
Years of employment in higher education _28____ Yrs. of related experience outside higher education _____2______
Non-teaching experience _____

To determine compatibility of credentials with assignment:

a. List courses you taught this year and those you taught last year: (If you participated in team-taught course, indicate each of them and what percent of courses you taught.) For each course include year and semester taught, course number, course title and enrollment.

See Table 11

b. If degree is not in area of current assignment, explain. **Degree is in area of current assignment**

c. Identify your professional development activities during the past five years.
   - Refinement of chemistry 1105, and chemistry 2200
   - Refinement Chem. 2205 This is currently being taught via POGIL (process oriented guided inquiry lecture)
   - Refinement of Chem. 3315 Instrumental Analysis (partially taught via POGIL)
   - Development of physical-chem lab I and II

d. List awards/honors (including invitations to speak in your area of expertise) or special recognition
   1. In last five years.
      - Chair Northern West Virginia Section of the ACS,. 2015-2016
   2. Indicate any other activities which have contributed to effective teaching.
      - Attended and presented at Biennial Conference on Chemical Education BCCE conference,.
      - Attended 3 conferences on Process Oriented Guided Inquiry Lecture for Physical Chemistry Laboratory
   3. List professional books/papers published during the last five years.

      Presentations:
      - Helping students write better laboratory reports, Matthew J Scanlon , Biennial Conference on Chemical Education (BCCE), University of Northern Colorado, July 30, 2016
      - Using process oriented guided inquiry laboratories to promote teamwork, Matthew J Scanlon , Biennial Conference on Chemical Education (BCCE), University of Northern Colorado, July 30, 2016
      - Serendipitously re-structuring the first-year chemistry experience to meet the guidelines of the Association of American Medical Colleges (AAMC). Erica L. Harvey, Matthew Scanlon, Steven Roof, and Andreas Baur. Poster selected for and presented at the SciMix poster session at the 246th ACS National Meeting, Indianapolis, IN, September 9, 2013

4. List externally funded research (grants and contracts) during last five years. .
    - Fluorescence Spectroscopy in Undergraduate Education Pittsburgh Spectroscopy Grant 2016, $6000
    - Equipment and summer camp, George W. Bowers Family Charitable Trust $15000
    - Coal Run Stream Rehabilitation, NASA Space Grant award $3000 2017/18
    - Atomic Absorption Spectroscopy: FACT Center + Fast Track to Research, WV EPSCoR Instrumentation Grant $20,000, 2017
    - Co-author, WV EPSCoR FY2018 Innovation Grant Program Proposal, Creation of a Fast Track to Research at Fairmont State University, Declined $40,000
    - Atomic absorption instrumentation in undergraduate education, Pittsburgh Conference Memorial National College Grants Program, Oct 2017, Requested $10,000

Appendix III: External Review

3/01/18

To whom it may concern,

I am currently a research chemist for the US Army Corp of Engineers and serve as a collateral professor at Virginia Commonwealth University and adjunct professor at Louisiana Tech University. I earned my PhD in chemistry from West Virginia University in 2004 and graduated with a chemistry degree from Fairmont State University in 2000. Presently, I have over 30+ peer reviewed publications and author a blog focusing on the recent advances in nanochemistry. My external review of the Chemistry Department is grounded from my experiences, previously submitted program reviews and discussions with current faculty members.

Personally, as an undergraduate student, I felt that the Chemistry Department at Fairmont State did a remarkable job preparing me for graduate school to the extent that I was able to pass all of my qualifying exams upon entrance. It appears over the last 5 years that this trend is still viable since 88% of the students are employed or in graduate education.

Recruitment and retention are listed as top priorities and it is clear that they are succeeding in this effort. Based on the information in Table 1 indicating there is a decline in undergraduate students attending college. However, the chemistry department has maintained similar graduation rates over the last 5 years which is truly significant. The increasing trend of students continuing in and succeeding in chemistry related fields indicates to me that the rigorous standards, when I was an undergraduate, have not been compromised to achieve this goal.

The course catalog makes the following claim:" With small class sizes, innovative teaching approaches, and hands on access to modern, research-quality instrumentation, students can develop the analytical, problem-solving and teamwork skills necessary to successfully pursue science-based careers." As an undergraduate, I lacked the foresight to fully grasp the significance of this statement. Looking back, it was these core concepts that continue to be the basis of my success performing cutting edge research.

Also, it is noteworthy to see that the Chemistry Department is offering multiple degrees with emphasis on biotechnology in addition to the traditional BS (which is ACS approved) and a BA for educators specializing in chemistry. With the current crisis in the school system, 2018 teacher strike, and in 2017 WV ranked 45 for the top high schools, having educators with a solid background in chemistry is vital.

Having students declare a true major is also a step in the right direction. The report indicates that, "While it is not possible to graduate with a major in pre-medical studies, incoming students don't realize that, and have no particular incentive to declare a true major. Some incentives have been applied, such as allowing students to apply for NASA WV Space Grant Consortium research fellowships only if they have a declared major in our college and not as a "pre" major." I was one of the "pre" majors entering college and was not aware that this was an issue.

In my previous review I highlighted that the goal of the department to have at least one full time faculty member teaching a section of service courses every term rather than adjunct professors, graduate students, etc., as is often the case in larger Universities is also vitally important, and still believe it today. I also continue to believe having full time faculty teaching these courses is the primary reason for continued success in scientific fields.

The Chemistry Department has made significant strides with connections / collaborations with neighboring industries and/or government labs and should be commended on their effort. Another possible fusion is participating in the ARMY Science, Mathematics, and Research for Transformation (SMART) and College Qualified Leaders (SEAP-CQL) programs.

Thanks,

Garry P. Glaspell Ph.D

USACE ERDC; Chemist

Fellow, Center for the Study of Biological Complexity (VCU)

Collateral Professor, Department of Chemistry (VCU)